A CASE STUDY OF THE APPLICATION OF LONG RUN INCREMENTAL COST MODELS IN THE JORDANIAN TELECOMMUNICATIONS INDUSTRY OVER THE PERIOD 2006 - 2012: PERFORMANCE, EFFICIENCY AND IMPLEMENTATION ISSUES

A thesis submitted in partial fulfilment of the requirements of Cardiff Metropolitan University for the degree of Doctor of Philosophy

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DECLARATION

This work has not previously been accepted in substance for any degree and is not concurrently submitted in candidature for any degree.

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STATEMENT 1

This thesis is being submitted in partial fulfilment of the requirements for the degree of PhD (business Studies).

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STATEMENT 2

This thesis is the result of my own independent work / investigation, except where otherwise stated.

Other sources are acknowledged by footnotes giving explicit references.

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First and foremost, (Alhamdulillah) I thank Allah (the exalted) for blessing me with this brilliant opportunity. Therefore, I devote all this work to him. As Allah the exalted said, "Indeed, the matter belongs completely to Allah" (Al-Quran, Surat Ali Imran: verse 154)

I am using this opportunity to express my gratitude to everyone who supported me throughout the course of this PhD project. I am thankful for their inspiration, guidance, constructive criticism and friendly advice during the project work. I am sincerely grateful to them for sharing their truthful and illuminating views on a number of issues related to the project.

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ABSTRACT

The thesis examines the impact of the introduction, in 2009, of Long-Run Incremental Costing (LRIC) on the performance and efficiency of the wholesale market of the Jordanian Telecommunications Industry (JTI); an oligopoly industry composed of three, approximately equal sized firms, Orange, Umniah and Zain. Oligopolistic industries are associated with excess returns. The intention of the introduction of LRIC by the JTI regulator was to reduce excess returns and introduce a degree of competition.

The research examines the impact of LRIC on performance; comparing two periods pre LRIC 2006-2008 and post LRIC 2010-2012. The data set includes financial accounting data, gathered between 2013 and 2015, from published accounts and primary data drawn from surveys of managers in the three firms, the latter needed to overcome well-known issues of transparency and more importantly the firm’s concern with commercial sensitivity.

Analysis of the data revealed that adopting LRIC on pricing and costing apparently had significant impacts on performance; impact varied between measures; sales data (call traffic/volumes) were extrapolated and suggest some impact on competition and market share. Correlations between measures are interesting and not entirely of the order that theory would predict. One suggestion that emerges from correlation/covariance analysis is that performance and efficiency may be more reliably measured by composite measures than independent measures and that heat mapping comparative data is a useful management tool.

This thesis draws on a long tradition of cost and cost efficiency analysis in accounting and economics, culminating in the concept of LRIC, which is composed of both. LRIC is really a cost plus measure; an attempt to account for true opportunity costs in a situation where the marginal cost, in this case the cost of an additional call, simply as a variable cost is negligible (and falling with respect to the volume of traffic) but when full opportunity costs are taken into account, they are substantial.
The data set (population data, JTI is made up of the 3 firms) includes variables grouped under the categories of financial, operational and competitiveness. Variables considered include; rates of return on assets, equity and sales; profit margin, earnings and revenue; capital expenditure; calculated price and cross elasticities, and sales. The data set includes published and unpublished data and data from fieldwork consisting of structured surveys with JTI managers, carried out in 2013-2015. Confidentiality concerns and transparency issues were addressed. This involved the researcher in extrapolation of data especially with reference to sales, mark-up and industry competition.

The academic contribution of this thesis is the measurement of the extent of the application of the LRIC model methodology in Jordanian telecommunication firms through tracking the application and development of LRMC through LRIC in a new context (Jordan). Additionally, the impact of the application of the LRIC model methodology on the financial performance of the Jordanian telecommunication firms will be analysed using financial performance indicators. Another expectation is the contribution of an important set of feasible recommendations on increasing the efficiency of the JTI, taking into account the Jordanian context (Economides et al. 2008).

This study has many implications. First, from the view point of the regulator (TRC), service providers, whether incumbent or new entrants can earn a sufficient profit to cover a reasonable share of their cost of capital (investments). As a result, the prices of the services provided will be fair and reasonable for consumers. From this viewpoint, the research recommends the continuation of the application of the LRIC model for costing and pricing telecommunications services in the Jordanian telecommunications industry (JTI). Second, from the view point of the regulator (TRC) services providers, whether incumbent or new entrants, can earn a reasonable and sufficient profit and normal return on capital sufficient to cover a reasonable share of common and fixed costs by using an equal proportionate mark-up (EPMU) approach. Also to cover the cost of new investments which meet the increasing demand for next generation technology. This research, therefore, recommends the ongoing application of the LRIC model for costing and pricing telecommunications services in the JTI.
Third, from the viewpoint of the regulator (TRC) the efficiency of prices based on the LRIC model methodology may open the door for new entrants into the industry and also may lead to ensuring that incumbent and new entrants share fixed assets (network elements) with each other as well as encouraging competition. In addition, the efficiency of the LRIC prices will protect consumers’ interests by providing them with new technology at lower prices. Consequently, service providers, whether incumbent or new entrants can earn a reasonable and sufficient profit and normal return on capital sufficient to cover a reasonable share of common and fixed costs by using equal proportionate mark-up (EPMU) approach, and also to cover the cost of their new investments. Thus from this perspective, this research recommends the long-term application of the LRIC model for costing and pricing telecommunications services in the JTI.

Keywords: Long-Run Incremental Cost (LRIC); financial, operational, competitive performance; efficiency; Jordanian Telecommunications (JTI); oligopoly.
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List of Abbreviations

ABC                      Activity Based Cost
AD                       Access Deficit
AIC                      Average Incremental Cost
ASE                      Amman Stock Exchange
ATC                      Average Total Cost
AT&T                     American Telephone and Telegraph
BAK                      Bill and Keep
CAPEX                    Capital Expenditures
CAS                      Cost Accounting System
CCA                      Current Cost Accounting
CPNP                     Calling Party Network Pays
CPP                      Calling Party Pays
CSR                      Corporate Social Responsibility
EBITDA                   Earnings Before Interest, Tax, Depreciation and Amortisation
EC                       The European Commission
ECPR                     Efficient-Component Pricing Rule
EPMU                     Equal Proportionate Mark-Up
FAC                      Fully Allocated Cost
FAQ                      Frequently Asked Questions
FBWA                     Fixed Broadband Wireless Access services
FCC                      Federal Communications Commission
FDC                      Fully Distributed Cost
FE                       Fixed-Effect
FLC                      Forward-Looking Cost
GAAP                     Generally Accepted Accounting Principles
GAT                      General Agreement on Trade
GDP                      Gross Domestic Product
GHz                      Giga Hertz
GPM                      Gross Profit Margin
GSM                      Global System for Mobile
HC                       Historical Cost
HSPA                     High Speed Packet Access
ICT                      Information and Communications Technology
iDEN                     Integrated Digital Enhanced Network
ILECs                    Incumbent Local Exchange Carriers
IR                       Interconnection Rates
ISPs                     International Services Providers
IT                       Information Technology
ITU                      The International Telecommunication Union
JD                       Jordanian Dinar
JTI                      Jordanian Telecommunications Industry
JTG                      Jordan Telecom Group
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>LAC</td>
<td>Latin American and Caribbean</td>
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<tr>
<td>LRAC</td>
<td>Long Run Average Cost</td>
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<tr>
<td>LRIC</td>
<td>Long Run Incremental Cost</td>
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<tr>
<td>LRMC</td>
<td>Long Run Marginal Cost</td>
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<tr>
<td>LTE</td>
<td>Long-Term Evolution</td>
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<td>MC</td>
<td>Marginal Cost</td>
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<tr>
<td>MEA</td>
<td>Modern Equivalent Asset</td>
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<td>M.JD</td>
<td>Million Jordan Dinar</td>
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<td>MMS</td>
<td>Multimedia Messaging Service</td>
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<tr>
<td>MoICT</td>
<td>The Ministry of Information and Communications Technology</td>
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<td>M.S</td>
<td>Market Share</td>
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<td>MTC</td>
<td>Mobile Telecommunications Company</td>
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<td>MTRs</td>
<td>Mobile Termination Rates</td>
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<td>NP</td>
<td>Net-Profit</td>
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<tr>
<td>OOC</td>
<td>Objective Opportunity Cost</td>
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<tr>
<td>Ofcom</td>
<td>The Office of Communications</td>
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<tr>
<td>Oftel</td>
<td>The Office of Telecommunications</td>
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<tr>
<td>OPEX</td>
<td>Operating Expenses</td>
</tr>
<tr>
<td>PPF</td>
<td>Production-Possibility Frontier</td>
</tr>
<tr>
<td>RFC</td>
<td>Request For Comments</td>
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<tr>
<td>ROA</td>
<td>Return on Assets</td>
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<td>ROE</td>
<td>Return on Equity</td>
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<td>ROI</td>
<td>Return on Investment</td>
</tr>
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<td>ROS</td>
<td>Return on Sales</td>
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<tr>
<td>RPP</td>
<td>Receiving Party Pays</td>
</tr>
<tr>
<td>RPNP</td>
<td>Receiving Party Network Pays</td>
</tr>
<tr>
<td>SKA</td>
<td>Sender Keeps All</td>
</tr>
<tr>
<td>SMS</td>
<td>Short Message Service</td>
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<td>SRAC</td>
<td>Short Run Average Cost</td>
</tr>
<tr>
<td>TAT</td>
<td>Total Annual Traffic</td>
</tr>
<tr>
<td>TELRIC</td>
<td>Total Element Long-Run Incremental Cost</td>
</tr>
<tr>
<td>TI</td>
<td>Telecommunications Industry</td>
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<tr>
<td>TRC</td>
<td>Telecommunications Regulatory Commission</td>
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<tr>
<td>TRDS</td>
<td>Trunked Radio Dispatch Service</td>
</tr>
<tr>
<td>TSLRIC</td>
<td>Total Service Long-Run Incremental Cost</td>
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<tr>
<td>TSLRIC+</td>
<td>Total Service Long-Run Incremental Cost Plus</td>
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<tr>
<td>USO</td>
<td>Universal Service Obligation</td>
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<tr>
<td>WAP</td>
<td>Wireless Application Protocol</td>
</tr>
<tr>
<td>WTO</td>
<td>World Trade Organisation</td>
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<tr>
<td>YoY</td>
<td>Year on Year</td>
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<tr>
<td>1G</td>
<td>First Generation</td>
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<tr>
<td>2G</td>
<td>Second Generation</td>
</tr>
<tr>
<td>3G</td>
<td>Third Generation</td>
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</tbody>
</table>
List of Symbols

\[ Y^i_{(FP, OP, CP)} - Y^k_{(FP, OP, CP)} + E = f(LRIC^{2009}) \] \hspace{1cm} (1)

*Where:*

LRIC2009: Long Run Incremental Cost introduction in 2009

\( Y^i_{(FP)} \): Competitive Performance measures as: ROE, ROA, ROS and GPM in period i.

\( Y^k_{(FP)} \): Competitive Performance measures as: ROE, ROA, ROS and GPM in period k.

\( Y^i_{(OP)} \): Competitive Performance measures as: Capex, EBITDA, Revenue and Net Profit in period i.

\( Y^k_{(OP)} \): Competitive Performance measures as: Capex, EBITDA, Revenue and Net Profit in period k.

\( Y^i_{(CP)} \): Competitive Performance measures as: Market share, customers and Service cost in period i.

\( Y^k_{(CP)} \): Competitive Performance measures as: Market share, customers and Service cost in period k.

E: Constant Factor.

i: relates to competitive variables over the period 2006-2008

k: relates to competitive variables over the period 2010-2012

j: Orange, Umniah, Zain
Overview

In this chapter, background information on the Jordanian Telecommunications Industry and the mobile wholesale interface is introduced. This is followed by an explanation of the motivation for this research, which is focused on the application of the Long-Run Incremental Cost (LRIC) model for costing and pricing in the wholesale telecom market (interconnection services). Thereafter, the contribution, problems, importance, aims, objectives, methodology, conceptual framework and the hypotheses of this research are also summarised. Finally, the layout of this research is presented.

1.1 The Focus of the Research

The primary concern of the research is the impact of long-run incremental pricing and costing (LRIC) on the Jordanian Telecommunications Industry (JTI). This thesis looks at the entire population of that industry which consists of three major oligopolistic firms who share the Jordanian Telecommunications sector, namely Orange, Umniah and Zain. The LRIC model was instituted in Jordan in 2009, at the insistence of the government and the Telecommunications Regulatory Commission (TRC).

The research, therefore, covers two periods; the period prior to the introduction of LRIC pricing, that is the three years from 2006 through to 2008, and the period after the introduction of LRIC pricing, three years from 2010 to 2012.

The focus of attention is on the wholesale market, charging calls from the customer of one supplier to the customer of another. That is, the cost and price of transferring mobile calls from one supplier to another, or indeed the internal pricing in a particular firm. Essentially, it is a problem of transfer pricing, either between firms or within firms. The issues are very similar, particularly when thinking about the focus of the thesis, which is the impact of LRIC pricing and costing on firms’ performance, efficiency, pricing and on competition generally.
The bulk of the thesis is concerned with empirical issues and later on in the thesis I will discuss research design, the research questions and the objectives. There is also an academic question, which concerns LRIC in the context of the development of cost theory and competition theory in the history of economic thought. For instance, to what extent does LRIC pricing represent an advance in economic and accounting thinking about cost efficiency and pricing.

Does LRIC pricing add value to the theory of cost? To discuss this an account of the evolution of costing theory is necessary, this will take place mainly in the literature review. The question of the contribution of LRIC, in itself, to the thinking on cost will be examined. This is addressed in most of the early literature on cost and pricing in firms connected with the old economy, LRIC has been designed for pricing in utilities (rail, water, gas, and other, what used to be called natural monopolies) which are mostly old economy firms, except for telecommunications; essentially a new economy.

Above discussion shows many gaps and questions, which the current study tries to answer. (a) from an economic theory point of view, what does LRIC costing add to the understanding of costs, is it simply a reworking of old ideas; and the principal issue? (b) What does LRIC add to the practical issues of efficient pricing and costing in telecommunications? One might think that correct pricing, or right pricing is a phrase that needs to be transformed into operational terms; terms that are falsifiable.

1.2 Telecommunications Industry Components and Interconnection Services

Jordan is considered an emerging and developing country. The government of Jordan attracts foreign investments into its liberalised industries, especially the telecommunications industry. The JTI has been developing rapidly over the past few years. There are several factors which have precipitated this rapid growth, the major factor being the implementation of the JTI reforms (Calzada and Trillas, 2006).

The JTI, such as telecommunications worldwide, is divided into two main parts according to network types (see Fig. 1); fixed line network (landlines), and the mobile network. A fixed network is usually controlled by a single operator, frequently a state owned monopoly, though this is changing. In contrast, in the mobile network, there are many
Introduction

Mobile networks can be owned and operated by two types of operators; incumbent and new entrants. In the JTI Orange, Umniah and Zain are incumbents, but new entrants, sharing their facilities, are encouraged by the regulator.

The main consideration of this research study is to analyse the costing and pricing of the telecommunications industry. According to figure (1), the fixed costs of the mobile networks are more than those in the fixed line networks, because the fixed line networks are considered to have covered fixed costs historically. There are many more competitors in the mobile networks, which precludes recovering fixed cost in a short time period (Genakos and Valletti, 2011).

In the mobile wholesale market there are three ways in which a call from customer A to customer B can take place: mobile A to mobile B, mobile A to fixed line B and fixed line A to mobile B. This thesis is concerned with the mobile A to mobile B wholesale market, interface price and cost.
Introduction

Traditionally, the problem of efficient costing and pricing in the JTI is the method of calculating the cost and prices of telecommunications services in order to ensure the prices are reasonable and sufficient for services providers to invest, reinvest, sustain their assets, and make a fair return for shareholders. A price low enough to permit new entrants to access these assets, as well as reasonable and fair for consumers. Efficient costing and pricing encourage competition among service providers. Moreover, this also leads to new investments to meet the increasing demand of consumers for next generation technology (Flacher and Jennequin, 2008).

Generally, the mobile Telecommunications Industry (TI) is a complex industry in terms of the presence of a huge number of fixed assets (network elements), which by necessity may be shared with each other to provide most telecommunication services. Thus, in the real world many fixed assets in the telecommunications networks have long lives and are not easy to replace with new efficient elements, even though there are new technologies being launched routinely (Hansen and Andersson, 2009). Figure 2 shows the telecommunications networks architecture, the interconnection services between two operators that make up the wholesale market.

Figure 2: The Telecommunications Networks Architecture

* source: Author’s own figure.
Introduction

This research study discusses the issue of costing and pricing in the telecommunications industry, focusing more on the wholesale market, especially the interconnection services charges between operators themselves; that is, Business to Business.

As shown in the figure 3, the importance of interconnection services lies in insuring that customer A can contact customer B, where they are not on the same network. This means that operator A will use the network of operator B, where operator A is a new entrant and operator B is an incumbent. This concept leads to many questions in the interconnected network such as, how much the incumbent will charge a new entrant. Or how much should a new entrant pay to the incumbent for using its network? On the other hand, does the incumbent use its significant market power to set high interconnection charges to exclude the new entrant from competing? What is the efficient price that operator (B), as an incumbent, should charge operator (A) as a new entrant? These are critical questions for the regulator monitoring efficiency, along with the price charged to customers, telecom profits and adequacy of investment funds and all indicate that competition is essential for efficiency.

Figure 3: Interconnection Services Between an Incumbent Operator's Network and new Entrant Operator's network

* source: Author’s own figure.
Introduction

The regulator has to be concerned not only with the efficiency of the incumbent, but also the efficiency of new entrants. Therefore, this research recommends how interconnection rates should be computed if charges are to be set to mirror the efficiency of the LRIC methodology (Dewenter and Haucap, 2005).

Economic regulators are tackling the prices set by the service providers, who have significant market power. In a normal competitive market, the role of those economic regulators is, essentially, to control the price level of service providers in this market. In a fully competitive market in any industry, the service price would be equivalent to the cost (price equal marginal cost, the situation under idealised perfect competition) which would, according to theory, reflect the efficiency level of a firm. To cover a reasonable share of sunk and fixed costs, a normal return on capital would be sufficient, and the Equal Proportionate Mark-Up (EPMU) approach can be used for this purpose. Estimating the LRIC has become the established way of controlling the pricing level of service providers and it aims, as far as possible, to mimic the situation in a fully competitive market (Armstrong et al. 1996).

When customer A calls customer B and they are customers of an efficient network, a number of issues arise: (a) there is a variable (a marginal cost) which is self-negligible, (b) there is an implicit cost of using fixed assets/services. A large number of fixed assets/services are usually involved; hence, they have a joint cost problem. This joint cost problem, and fixed cost issue is usually referred to under the heading of common costs. The following definitions and examples are useful at this stage:

Incremental Costs

“These additional costs are the implicit cost producing additional unit of a specific call: Implicit because, strictly speaking, actual marginal costs are near zero but the cost of the use of fixed services is added in. For example, the implied costs of central office switching, cable and wire facilities services, and so on if they were added would be substantial (Berger, 1998).”
Introduction

Joint Costs

“These costs are caused by a group of products. To produce a group of services the network operator has to incur this kind of cost. It is difficult to allocate these costs independently for each service in this group. These costs lead to what is known as common costs.”

Common Costs

“These costs are caused by all of the provided services in general from the network operator. In other words, these costs are shared across all the services provided. Common costs include general and administrative costs (for example, accounting and finance, external relations, and human resources) and support costs (for example, general purpose computers)” (Flacher and Jennequin, 2008).

Returning to the issue of incremental costs in the wholesale market, the regulator is concerned with assessing costs incurred by service providers; the cost of meeting existing demand and the anticipated increased customer demand on the services in the long run from using the current and increasing the future capacity of the network.

Some authors refer to Equal Proportionate Mark-Up (EPMU), an additional cost over and above LRIC, to allow for investment and reinvestment. While other authors, the dominant approach defines LRIC to include all elements: incremental and a cost plus for fixed, joint or common costs and a return to shareholders that enables profitable investment and reinvestment. A number of definitions of LRIC are contained in the literature. They amount to the same thing, but they approach LRIC from different perspectives.

The LRIC model is used to calculate and estimate the incremental costs incurred in the long run by new entrants, i.e. by an efficient competing service provider. This, essentially requires an evaluation of existing assets by using the technique of Modern Equivalent Asset (MEA), using the current cost method of replacing assets with more efficient and similarly functioning ones (Currier, 2011).
Introduction

According to the TRC, LRIC is a forward-looking cost standard that is commonly used by telecommunications regulators to set interconnection prices. Colasanti (2006) notes that LRIC is a forecasting cost model over the long run that uses increments as a basis to allocate service providers costs. According to Ofcom (2008) LRIC provides efficient price signals to the market, and results in forward-looking costs building and operating a modern network. Christodoulou and Vlahos (2001) describe LRIC is a method used to provide accurate signals to prospective investors on efficient competitive prices for telecommunications services in a competitive market, and on what efficient costs these prices should be based on. The LRIC model is one of several cost calculation methods the Telecom Regulatory Commission can use in relation to price regulation.

LRIC is defined as the cost of adding a new service or product to existing services or products, or by contrast, the cost that would be avoided for dropping an existing service or product from the existing services or products of a service provider. As indicated by the IRG (2000), LRIC is a costing method usually used to allocate costs and therefore, used to estimate service prices that are calculated based on cost.

The resulting efficiency of the LRIC prices should protect the consumers’ interests by providing them with better technology at a lower price. It also informs service providers, whether incumbent or new entrants, whether they would earn a reasonable profit sufficient to cover a reasonable share of the cost of capital investment (Brealey, 2012).

LRIC methodology has been adopted in the JTI since 2003, and it has been applied by the TRC since 2009. As such, the JTI has a new application methodology for costing and pricing interconnection charges among incumbent and new entrants. It should be noted that in the LRIC models’ methodology is considered best practice as it has been applied in developed countries for a considerable length of time (in the USA by FCC in 1996, in the UK since 1997 and in the European Commission from 1997 and 1998). LRIC as used in the thesis (unless otherwise stated) is defined to include all the mark-ups over and above variable (marginal) cost.
1.3 The Research Problem

The research can be described briefly as examining the impact of the introduction, in 2009, of Long Run Incremental Costing (LRIC) on the performance and efficiency of the wholesale market of the Jordanian Telecommunications Industry (JTI); an oligopoly industry composed of three approximately equal sized firms, Umniah, Orange and Zain. Oligopolistic industries are associated with excess returns. The intention of the introduction of LRIC by the JTI regulator was to reduce excess returns and introduce a degree of competition.

The domain of study is the JTI. Telecommunication is a new economy industry, divided into two sectors; fixed traditional phones and mobile transmission (telecoms) through base stations and switching centres. The thesis concerns the mobile wholesale market in the JTI; transactions between one mobile operator and another. For example, when a customer of Orange calls a customer of Umniah, this involves the use of Orange’s assets by Umniah. The regulator may ask ‘What is the efficient pricing and costing for Orange to adopt?’ Long Run Incremental Costs (LRIC) provides an answer; it is adopted worldwide in utilities, including telecoms.

A critical issue concerns fixed costs; in the current terminology of telecommunications common costs. The incremental (marginal, variable or additional) cost, of transferring a call from a customer of one telecoms provider, to a customer of another, includes both a (negligible) variable cost to the provider plus an allowance for the opportunity cost of the use of the providers fixed assets. The regulator, concerned with efficiency, must take both into account. He or she must also add a profit margin that is high enough to ensure a fair rate of return to shareholders plus an allowance enabling the firm to invest, yet low enough to allow potential new entrants to hire fixed assets. Essentially, the efficiency concerns are the same if the call is internal to a single provider; this is an issue of shadow or dual pricing.

The research examines the impact of LRIC on performance; comparing two periods pre LRIC 2006 -2008 and post LRIC 2010-2012, gathered between 2013 and 2015. The data set includes financial accounting data from published accounts and primary data drawn
Introduction

from surveys of managers in the three firms, the latter needed to overcome well-known issues of transparency and firm’s concerns about commercial sensitivity.

Clearly, efficiency is an important concern. But, efficiency is an elusive concept. It involves balancing interests that often do not coincide, making the role of the regulator complex. An efficient price is one that balances the interests of stakeholders. Efficiency involves multiple stakeholders; the consumer (*Does price reflect true cost? Is it fair from his or her point of view? Is it affordable? Mobile telephones are considered a necessity by many consumers. Are they?*), the community (*Are society’s scarce resources being used effectively with regard to opportunity costs?*), competition (*Is price low enough to make entry possible?*), the shareholder and prospective investors, (*Does price enable a return high enough to cover all costs, and provide sufficient returns to the incumbent?*), the employee (*Are wages high enough to attract talent, retain employees, provide a decent standard of living?*). Added to these issues the need to accommodate technological change in the industry and consider the importance of telecommunications as an infrastructure for many other industries in a developing economy. These are important concerns.

Figure 4 shows the contribution of fixed costs in relation to variable costs in a falling average cost industry (Arnold, 2008).

**Figure 4: Contribution Cost in LRMC, LRAC, LRIC**

Calculating the efficient price creates some critical problems in the JTI such as: *what is an efficient price to charge for fixed assets? What is an efficient price that makes a contribution to fixed costs? What is an efficient price that should be charged by the incumbent to new entrants?* Answering these questions is critical to the JTI and this research.

Historically, Marginal Cost (MC) was set to be the most efficient method of pricing (Kahn, 1988; Mandy, 2002). Marginal cost pricing is associated with Pareto optimality and competition (*ibid.*). But, in today’s new economy industries, the Marginal Cost of a service is negligible when compared to the huge amount of fixed costs. Fixed costs are important for reinvestment in fixed assets in order to keep a pace with rapidly moving technological changes. From an economic perspective, the best-known notion of economic efficiency is Pareto efficiency. Pareto efficiency is achieved when output is produced at minimum opportunity cost.

To address the problems of efficient pricing which is our main research problem, the first step is to explore what is meant by efficiency. The difference between economic efficiency and technical efficiency should be clarified. Economic efficiency means producing at minimum opportunity cost. By contrast, technical efficiency is an engineering concept of cost. It takes into account the first and second laws of thermodynamics. Production involves the transformation of the energy of inputs (resources and assets of all kinds) into outputs. In the production process energy is conserved (the first law of thermodynamics), two kinds of outputs result (a) useful goods and services and (b) waste. All processes involve waste (the second law of thermodynamics – the entropy law). Technical efficiency amounts to identifying efficient production while minimising waste; getting the highest ratio of output to inputs. The difference between the two concepts of efficiency is clear. Economic efficiency takes into account the cost of inputs and the selection of which inputs are chosen, whereas technical efficiency takes into account the choice of inputs (Flacher and Jennequin, 2008).

This thesis will focus on economic efficiency; that is, economic efficiency as reflected in financial data competition and operational data. Strictly speaking, if markets work as expected, then efficiency at the operational level should be reflected in the financial and
management accounting data of a company. Economists often complain that accounting data does not correspond with what is required for economic analysis. Traditionally, the economics literature has equated economic efficiency with firms charging a price equal to marginal cost of production. Therefore, marginal cost pricing and efficiency have become more or less synonymous. Moreover, there is a very important hypothesis in economics, which equates economic efficiency and Pareto optimality with perfect competition (Economides et al. 2008).

It is not necessary in this thesis to explore the economics of perfect competition, as a modern economy does not correspond to an economy in a state of perfect competition. A further rationale for this decision is that this thesis is concerned with the Jordanian telecommunications industry, which is an oligopoly. However, traditionally regulators and governments encourage an efficient production situation and use the idea of marginal cost pricing and competition. Marginal cost pricing and competition are very closely related in the mind-sets of policy makers and telecommunication regulation reflects both these concepts. LRIC pricing and costing is an offshoot of marginal cost pricing as a route to efficiency (Flacher and Jennequin, 2008).

A task of regulators is to encourage competition; reducing prices benefits customers and permits new entrants who do not own the necessary fixed assets to hire them at a price that enables them to compete successfully with incumbents. The regulator must at the same time ensure that prices are such that incumbents and new firms can finance innovation (ibid.).

The figure 5 shows the various components of the JTI that can be controlled using the LRIC model. This figure is useful in meeting the objectives of this thesis as it links the components into a single model.
Introduction

Figure 5: The Components of the JTI that can be controlled by the LRIC Model

1.4 Research Question

The research problem was answered through the formulated research questions, that include consideration of the following issues:

The key research questions concern the impact of applying the LRIC model in the JTI over the period 2006-2012 and particularly refers to its impact (a) on firms’ performance in the JTI and (b) firms’ efficiency with respect to financial, operational and competitiveness indicators.

The research addresses standard definitions of LRIC, LRIC methodology, JTI data of the three firms, considerations of alternatives, emergence of LRIC as a concept, implementations issues and recommendations.

1.5 Aims and Objectives of this Research

The central aim of the research is the examination of the impact of the application of the LRIC model - adopted and applied as an interconnection cost model by the TRC and the Jordanian telecommunications companies (operators) - on three firms (Orange, Umniah and Zain) in the JTI in terms of implementation and efficiency issues over the period 2006-2012, and the impact on the performance of the firms through the related
Introduction

performance aspects: finance, operations, competition and efficiency, using secondary and primary data gathered by the researcher over the period 2013-2015.

To achieve the central aim as set out above, the following specific objectives are addressed:

1. To examine the impact of the application of the LRIC models using a variety of accounting data; financial, operational and competitive on a vector of performance issues (a) within firms and (b) between firms,
2. To examine the impact of the application of the LRIC models on efficiency (a) within firms and (b) between firms, using the accounting data in the above.
3. To develop an efficiency model that includes essential factors that impact the JTI efficiency through the application of the LRIC model.
4. To develop a set of recommendations relating to assessing the performance and efficiency of firms in the JTI, this will be based on a correlation matrix and heat map generated from the matrix on how best to increase the efficiency of the JTI by implementing the LRIC model on the basis of number three above.

To achieve the objectives set out above this research will:

1. Design a conceptual model relating to the aims, gather and analyse the relevant data.
2. Relate the accounting data gathered in the research to economic issues underlying performance and efficiency.
3. Demonstrate how the concept of LRIC has emerged from economic and accounting literature.
4. Address the evolution of the LRIC model from its foundation in the economic theory of cost and the management accounting tradition.
5. Examine, clarify and specify the methodological and empirical base of the study.
6. Compare the outputs from applying the LRIC methodologies in the selected JTI firms.
Introduction

7. Describe the context of the study, the JTI’s structure and relationship to the Jordanian economy and its developments.

1.6 The Research Conceptual Framework

The research question implicates the use of a simple conceptual framework that can be summarised by two relationships:

(1) The relationship between the application of LRIC in the JTI in 2009 and the performance of the three firms (Orange, Umniah and Zain) in terms of financial, operational and competitiveness performances.

(2) The relationship between the application of LRIC and the efficiency of firms in the JTI for the same period.

These relationships include (a) performance measures under three headings: financial indicators (ROA, ROE, ROS and GPM), operational performance indicators (Revenues, EBITDA, Capex and Net Profit), competitiveness indicators (Customers, Market Share and Service Cost) and economic indicators (Price Elasticity and Cross Elasticity). (b) a comparative analysis of efficiency implementations of these measures: LRIC was instituted in 2009, therefore data from two periods - pre LRIC 2006-2008 and post LRIC 2010-2012 is compared.

Figure (6) illustrates the conceptual framework of this research.

Figure 6: Conceptual Framework

* Source: Author’s own figure.
1.7 Research Hypotheses

A- Main hypotheses

$H_1$: The application of LRIC models has had a significant positive impact on the performance variables of Orange, Umniah and Zain in the JTI.

$H_2$: There is a significant positive relationship between the performance variables in the correlation matrix.

B- Sub hypotheses

$H_{1a}$: The application of LRIC models has had a significant positive impact on the financial performance variables of Orange, Umniah and Zain in the JTI as measured by ROE, ROA, ROS and GPM.

$H_{1b}$: The application of LRIC models has had a significant positive impact on the operational performance variables of Orange, Umniah and Zain in the JTI as measured by revenues, EBITDA, Net Profit and Capex.

$H_{1c}$: The application of LRIC models has had a significant positive impact on the competitive performance variables of Orange, Umniah and Zain in the JTI as measured by Market Share, Customers and Service Cost.

1.8 Research Methodology

This study draws on a long tradition of literature in economic, financial, and accounting journals, books and articles. The literature focuses on the general nature of the telecoms industry and the specific nature on the JTI.

A- Data Set

Population data relating to the three oligopolistic firms (Orange, Umniah and Zain), between 2006-2012, in the wholesale telecommunications market, JTI.

B- Data Resources

1. Financial and Accounting Data

Financial and accounting data has been collected through the companies’ published reports, including balance sheets and income statements for the selected firms in the JTI, that apply the LRIC model for costing and pricing services. The data is in the form of companies’ reports are easily accessible. Furthermore, this
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data has been collected for the period before (Ex ante) and after (Ex post) applying the LRIC model. Accountants can read and understand this data, and therefore, use it to measure the impact of applying the LRIC model on the financial performance of these firms. Moreover, the financial performance will be measured through five standard indicators according to Steven (2007) and Gitman (2001), which are: Return on Equity (ROE), Return on Assets (ROA), Return on Sales (ROS) and Gross Profit Margin (GPM).

2. Questionnaire

Surveys were arranged with financial managers in the firms in the JTI. In-depth surveys were distributed for the purpose of covering efficiency, competition and operation aspects, of the firm's performance as well as to obtain more information on the implementation of LRIC.

It should be noted that the research methodology is presented in detail in chapter four.

1.9 Research Importance and Significance

The significance of this research emerges from the research problem mentioned above, which explain that this research focuses on interconnection services, and that the rates of the interconnection services should be calculated based on a cost model (LRIC model) (see Fig. 3).

It was noted that the telecommunications industry evolved from monopoly based telephone services to provide competitive services and allowing customers to move between networks and service providers. During the monopolistic period, charges were frequently not calculated on costs but generally, international services supported and subsidised national services. As it were, income from international services covered part of the domestic services costs.

This study is important as it discusses the theoretical basis of LRIC models, the application of LRIC models in the JTI, the basis for their utilisation in economic regulation contrasted with different techniques. It also explores the challenges and weaknesses in executing these models in practice. This study discusses the reasons for
implementing regulated prices for telecommunication services providers based on LRIC models. This research is significant because it explains how the LRIC model can attract investors and new entrants which will promote innovation and encourage competition between the services providers (Flacher and Jennequin, 2008).

Addressing all the previous steps involves several stages such as the analysis of the financial data of selected firms in the JTI, conducting personal surveys with financial managers in the JTI to compare LRIC methodologies and including implementation methodologies.

The academic contribution of this thesis is the measurement of the extent of the application of the LRIC model methodology in Jordanian telecommunication firms through tracking the application and development of LRMC through LRIC in a new context (Jordan). Additionally, the impact of the application of the LRIC model methodology on the financial performance of the Jordanian telecommunication firms will be analysed using financial performance indicators. Another expectation is the contribution of an important set of feasible recommendations on increasing the efficiency of the JTI, taking into account the Jordanian context (Economides et al. 2008).

The research’s importance and significance can be summarised as below:

A- This research is significant because it is focused on the telecommunications industry in Jordan which is central to Jordanian economic development.

B- Communication technology is central to the development of any economy.

C- The research uses new data and new data resources, which has been used in an innovative way.

D- The research has developed an existing theory, which has a long tradition in economics, and applied it in a new context; Jordan.

In summary the claim to originality and contribution of the thesis is as follows:

1. The application of LRIC to a new context the JTI.
2. New data related to the JTI is explored.
3. A long tradition of cost analysis in economics and management accounting is extended into the concept of LRIC and the JTI.
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4. A set of recommendations relating to the efficiency of JTI as a result of LRIC model.

5. Possibilities of extension of this research into new areas; especially in respect of judging efficiency by examining relationships between a set of variables rather than variables in isolation. The thesis takes some steps in this direction, but, importantly, opens up fruitful areas for further research.

1.10 Research Contribution

Each chapter of this research provides a distinctive contribution. This first chapter presented the research problem and justification for the study. The aims and objectives and research question were formulated and proposals made on how these will be addressed.

Chapter two addresses the emergence of the application of the LRIC model, which has a long tradition in economics. This chapter shows that the researcher has developed on an existing theory of cost and pricing through presenting a comprehensive literature review to clarify the complex issues that relate to the relationship between management accounting and economics.

Chapter three illustrates how this research has applied the theory developed and presented in chapter two in a new context, that of Jordan. Chapter four discusses, in more detail, the relationship between management accounting and economics by using accounting measures from opportunity costs that are mainly used in economics to assist decision makers.

Chapter five and six introduces the methods used by the researcher in obtaining new data and data resources; accounting data, surveys, questionnaire and economic data, and how this data was analysed innovatively.

Finally, chapter seven presents a set of recommendations determines avenues for further research and also discusses the bridge-building between the theoretical framework and the conceptual framework by presenting the main findings and results of the research obtained from the relevant analysis of empirical data.
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1.11 The Logic of the Research Layout

The thesis examines the impact of the introduction, in 2009, of Long Run Incremental Costing (LRIC) on the performance and efficiency of the wholesale market of the Jordanian Telecommunications Industry (JTI); the wholesale sector has an oligopoly structure composed of three approximately equal sized firms, Umniah, Orange and Zain. Oligopolistic industries are associated with excess returns. The intention of the introduction of LRIC by the JTI regulator was to reduce excess returns and introduce a degree of competition. The intentions of the Regulator in introducing a LRIC model for setting interconnection rates is captured briefly as a framework that ensures that interconnection charges satisfy the condition of competition.

This brief quotation captures both the intention behind the introduction of LRIC and the vagueness of the intention unless the notion of what constitutes competition is specified. Specification in this thesis is guided by competition theory according to which the introduction of competition even in oligopolised industries potentially reduces excess returns, increases the efficiency of firms, and as far as possible eliminates entry barriers. Stating potential impacts conceptually is relatively straightforward compared to the task of detecting them empirically. This task motivates the research.

The regulator, concerned with the impact of LRIC, must assess the appropriate cost plus or mark-up, over and above variable cost, from the point of view of; the shareholders’ profit; the community; the potential entrant and price charged by incumbents for fixed assets; the final customer, the size of her or his mobile phone bill; the government which is concerned with investment and socio-economic development.

The conceptual model of the thesis is built upon competition theory; this model enabled the researcher to formulate two testable hypotheses.

Hypothesis 1: The application of LRIC models has had a significant impact on the performance variables of Orange, Umniah and Zain in the JTI.

Hypothesis 2: There is a significant relationship between performance variables in the correlation matrix.
In testing the hypotheses, the researcher was aware that although population data was available for the oligopolised wholesale sector of the JTI, the amount of data accessible covers a limited period. Only data for the three years post the introduction of LRIC in 2009 was available at the time of the research and a comparison was drawn with the three years prior to 2009.

Over such a short period, dramatic results could not reasonably be expected. So the path chosen was to delve deeper into the available data using competition theory as a guide.

The path involved breaking hypothesis into three sub-hypotheses 1; the first two sub-hypotheses relating to financial and operational performance data; the third sub-hypothesis relating to competition data – market share of the three firms, number of customers and the impact on service costs after the introduction of LRIC. Using competition data, the researcher attempted to detect relative shifts in the market share of the three firms. Digging further into the data and extrapolating sales figures facilitated estimates of the impact of LRIC on (a) demand elasticity on the wholesale market and (b) cross elasticity with respect to changes in interconnection rates. Considering the three sub-hypotheses enabled the researcher to make an overall assessment relative to the main hypothesis.

The second hypothesis, even at this stage, needs further explanation. It follows the path referred to above in more depth, questioning whether there is a pattern to be found in the variables contained within the broader categories; financial, operational and competition. Market efficiency would lead us to expect that the variables form consistent patterns; measures of rates of return, profitability, sales and number of customers in the wholesale market might be expected to be positively correlated. The pattern of these measures may also have been affected by such variables as CAPEX and service costs.

Heat maps are used to illustrate findings related to the second hypothesis. Significant correlations between variables are highlighted in red; including those correlation values, that theory would not lead us to expect. Interesting recommendations emerge from the process of looking for patterns (finding principal components) suggesting that
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performance should be judged on the basis of groups of variables and interrelationships within groups, rather than treating performance measures.

Here the chapter by chapter summary in the previous section is enhanced to indicate the logic of the thesis development.

Chapter 2 This chapter starts with an historical overview of the LRIC pricing model; it reviews the evolution of the LRIC model by drawing on its long tradition in economics and linking it to the LRMC. Next, the viewpoints of the costing and pricing methodology according to accounting and economics are drawn. Related issues such as: marginal cost, efficiency, regulation, new entrant and incumbent are outlined. Finally, in this chapter, the literature review relating to the LRIC pricing methodology since 1770’s is further discussed.

Chapter 3 Is a second part of the research literature review, this chapter reviews the network pricing used in the JTI, in terms of introducing the background information about the JTI. The development of the JTI is further discussed through analysing the structure of the Jordanian telecommunications markets, in terms of the three telecommunications services providers (Orange, Umniah and Zain). Also, the role of the Jordanian telecommunications regulator, the TRC, is summarised. Finally, the impact of the Telecommunications Sector on the Jordanian Economy (facts and numbers) is reviewed in this chapter.

Chapter 4 The theoretical framework for this research is discussed further in this chapter by introducing background information on the traditional cost accounting systems. This is structured through sub headings such as: definition, function, importance and objectives, elements, concepts and criticisms. The circumstances that helped to establish the cost accounting system based on the LRIC models are presented and further discussed, for example using the activities-based costing (ABC) methodology to allocate indirect costs. Next, the essential liberalised utilities issues and why the telecommunications industry needs to be regulated are introduced. Finally, some general costing and pricing methodologies in the telecommunications industry are addressed in detail, taking into account interconnection related issues.
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Chapter 5 This chapter reviews in more detail the methodology that has been used to collect the data from the research community, it also illustrates the proposed measurement tool with the application elements designed for gathering data using qualitative methods (personal surveys - questionnaire). Next, this chapter discusses some statistical tools that have been used to analyse the collected data from personal surveys with financial managers and the heads of departments who are working in the telecommunications companies in Jordan. This chapter also presents the point of view of the Jordanian Regulator (TRC) on LRIC pricing models that have been adopted in the JTI.

Chapter five also presents the research model (conceptual framework) that has been used, it address the research hypotheses and the research questions. Finally, this chapter illustrates some further facts and figures on the three main JTI firms.

Chapter 6 This chapter presents the collected data in detail (methods and resources), it discusses statistical analysis on the one hand, and draws out, in more detail, the findings and results from the data.

Chapter 7 This chapter summarises the research, presents a discussion of the results, gives recommendations, suggests further research and identifies the limitations of this study. A summary of important results at this stage may enable the reader to assess the logic of the thesis.

Analysis of the data revealed that adopting LRIC on pricing and costing apparently had significant impacts on performance; impact varied as between measures; sales data (call traffic/volumes) were extrapolated and suggest some impact on competition and market share. Correlations between measures are interesting and not entirely of the order that theory would predict. One suggestion emerges from correlation/covariance analysis is that performance and efficiency may be more reliably measured by composite measures than measures independently and that heat mapping comparative data is a useful management tool.
1.12 Conclusion

In this chapter, background information on the Jordanian Telecommunications Industry and the mobile wholesale interface is introduced. This is followed by an explanation of the motivation for this research, which is focused on the application of the Long-Run Incremental Cost (LRIC) model for costing and pricing in the wholesale telecom market (interconnection services). Thereafter, the contribution, problems, importance, aims, objectives, methodology, conceptual framework and the hypotheses of this research are also summarised. Finally, the layout of this research is presented.
Overview

This chapter is divided into three sections, the first being an overview of management accounting in terms of: its nature, definitions, functions and the historical background of management accounting and its relationship with economics, followed by an historical overview of the Long-Run Incremental Cost (LRIC) pricing model, reviewing the evolution of LRIC models by drawing on its long tradition in economics and linking the model with the Long Run Marginal Cost (LRMC). Next, different viewpoints of costing and pricing methodologies according to accounting and economics principles are explored. Some related issues such as: marginal cost, efficiency, regulation, new entrants and incumbents are outlined. This chapter ends with a literature review which begins with Adam Smith Smith’s Deer – Beaver model (1770’s) and then exploring later periods which relate to new economy businesses using the LRIC pricing methodology.

2.1 Management Accounting (MA); Definition and Nature

Management Accounting is the process of calculating, assessing, identifying, interpreting and dissipating information on an organisation (Hilton, 2001:p4). It consists of financial documents and reports as well as non-financial information, which allow managers to make decisions that help achieve the goals of an organisation (Horngren et al. 2002). Management accounting not only provides information to managers but also to other parties of the organisation for smooth running of the organisation (Garrison et al. 2003). Management Accounting is treated as a core part of the organisation and managerial accountants work strategically, managing resources and operational works. Managerial accountants add value to the organisation (Hilton, 2001) as they help achieve the goals of the organisation.
The Institute of Management Accountants (IMA) has upgraded the meaning of Management Accounting to "a profession that includes collaborating in management decision making, chalking out new business plans (strategic planning) and performance management frameworks, and giving expertise in financial reporting and control to help management in the development and utilisation of the strategy of the organisation". (Statement No. 4 IMA, 1993)

Management Accounting has generally changed due to hierarchical advancements through four stages:

- First stage preceding 1950; the focus was on cost determination and financial control using budgeting and cost accounting techniques.
- Second stage from 1950 to 1965; the focus moved to the procurement and management control, for example, decision analysis.
- Third stage from 1965 to 1985; the target was the reduction of resource wastage.
- Fourth stage from 1985 to 1995; the priority was on the formation of quality through the utilisation of assets and technologies that measure the drivers of client value through organisational developments (Balogun et al. 2004).

2.2 Management Accounting Functions

Management Accounting plays a key role in an organisation, its goal is to provide management with both financial and non-financial data that is helpful in organising, and controlling, performance and basic leadership of an organisation. There is an interrelationship between these functions and administrators can execute each of these functions viably with Management Accounting data (Hilton, 2001). Financial accounting on the other hand just gives financial data to investors.

2.2.1 Planning Function

Management Accounting is crucial to Strategic Planning (SP) (Johnson and Kaplan, 1987). SP is concerned with formulating objectives and road maps for an organisation in the long run (Anthony, 1965). Management Accounting is also concerned with the methods that organisations use to achieve their objectives and goals. Such methods are generally linked with budgets and performance indicators (Lyne, 1988). Some issues of
product performance can be quantified in the budget (King et al. 2010), however, numerous other issues cannot. When a goal is quantifiable, the method for accomplishing it may not be known (Otley 1978; 1999; 2003).

### 2.2.2 Control Function

Management Accounting is an alternate system that can be utilised to control work and manpower processes (Hopper and Armstrong, 1991). Foucault (1977) described the criticalness of the improvement of new accounting frameworks for watching and controlling what people do. Accounting has the disciplinary aspect of harnessing the power of information (Busco et al. 2007).

Control in business is linked to learning made through accounting frameworks. Johnson and Kaplan (1987) portray how Management Accounting developments, specifically Return on Investment (ROI) and budgeting, have assumed a major role in bigger organisations. The utilisation of budgets and ROI was a method for increasing knowledge and in this way controlling administrative work forms and manpower procedures.

The degree of the utilisation of accounting control frameworks depends upon social and chronicled calculation (Ashton et al. 1991). Generally, the upsides of budgeting include developing the viability, coordination, support and arrangement of both control and acknowledgment forms through the appraisal of genuine results in contrast with plans (Clark, 1923). Moreover, budgeting is the foundation of management control in any organisation (Collier, 2003; Clark, 1923; Alexander and Nobes 2004).

### 2.2.3 Performance Evaluation Function

Foucault (1977) additionally emphasises the advancement of accounting strategies for measuring people’s actions. Accounting frameworks control strategic management. New Management Accounting performances were created to help with the performance assessment process. Management Accounting systems give information that assesses the performance of every individual and sector, the association-wide performance, and decides future hierarchical systems and strategies (Kaplan and Norton, 1996; Kaplan and Norton, 2001). Anthony (1965) contends that standard observational and performance reviews give an account of real accomplishments and are important in guaranteeing that arranged activities do in reality accomplishing the required results.
Thus, powerful management adopts the balanced scorecard methodology that incorporates performance measures in four key regions: financial, internal functioning, clients, innovation and knowledge (Kaplan and Norton, 1992; Hilton, 2001). Moreover, the financial performance measures that will be considered in this research study are the four standard indicators according to Steven (2007) and Gitman (2001) and these are: Return on Equity (ROE), Return on Assets (ROA), Return on Sales (ROS) and Gross Profit Margin (GPM).

2.2.4 Decision-Making Function

Effective leadership is an essential aspect of management. When an organisation first starts its business operations, it is generally on a small scale where the decision making is - for the most part - centralised in nature. As an organisation develops, in any case, its directors require more formal data frameworks, including administrative accounting data, so as to ensure better control over their business operations. Accounting systems are set up to record circumstances and provide the structure that helps in the undertaking of both external and internal financial reports. Budgets play an essential role in helping an organisation arrange their business activities in the market. As the organisation develops, the appointment of basic leadership becomes fundamental. Decentralisation is regularly the after effect of this inclination to designation that in the end creates a responsibility accounting framework. Subsequently, most expansive organisations are decentralized. Administrators throughout these organisations are offered self-rule to settle on choices for their subunits (Stickland, 1998; Hilton, 2001; Malone, 2003).

Libby and Lindsay (2010) described budgets and the budgeting procedure as value added. As a rule, it can be reasoned that the budgeting procedure has continued to be the foundation of planning and controlling procedures in contemporary organisations. Neely et al. (1989) and Hansen et al. (2009) pointed out that budgets and budgeting forms strengthen the centralisation of basic leadership. Libby and Lindsay (2010) emphasised their conclusions that the budgeting procedure is utilised by numerous organisations to bolster their systems.
2.3 Management Accounting and Its Roots in Economics

To adequately understand the present, it is critical to comprehend the historical backdrop of Management Accounting (Scapens, 2006). According to Pettigrew (1990:36) ‘history is not only the past; it lives in the present and may future. Chandler (1992) identified the scarcity of information on the history of Management Accounting. From the twentieth century, Management Accounting was basically concerned with cost accounting; for example, focusing on the allocation of goods and costs and also cost/goods tracing, in light of the idea of various costs for various activates (Clark, 1923). More prominent endeavours were exhausted in the inquiry of ‘How to represent overheads?’ (Ashton et al. 1991). In this way, overheads, and in additional manpower and materials, started to be traced to different goods in a deliberate way. Similarly, the issue of how to represent waste and scrap was, as a rule, effectively handled. In the 1920s, strategies for standard costing were accomplished (ibid.) and in 1925 cost accounting rose as a managerial tool (Garner, 1976).

Fleischman and Parker (1992) contended that cost accounting was vital in four matters: cost control, overheads tracing, effective leadership and standard costing. These areas could help managers in decreasing costs, amplifying revenues and protecting against rivalry. During the 1930s the focus moved to work on budgets and responsibility accounting and later extended to divisional performance estimation and transfer pricing in the 1950s (Ashton et al. 1991). The late 1950s to the late 1960s was the prime of Management Accounting research.

Research typically included using neoclassical economic theories to discover ideal answers for the issues of basic business leadership and control (Ashton et al. 1991). Consequently, the models - including economic revenue, return on investment, monetary value added, marginal cost and residual revenue - were efforts to programme basic leadership and control forms with the point of amplifying the wealth of the shareholders; Neoclassical economics gives careful consideration to decisions and choices (Ashton et al. 1991; Ryan et al. 2002). The mid 1970s was a time of scientific models oriented on economic principles that drew on transaction cost economics (Ashton et al. 1991; Ryan et
al. 2002; Scapens, 2006). Management Accounting scholars in the 1960s were developing mathematical models to manage unverifiable results and the costs of transactions and providing information (Scapens, 2006). Programming models, cost difference examination models, exchange estimating pricing models, performance assessment models and the opportunity cost model (ibid.) were developed. The main aim of all these models was to provide decision makers with a choice of methods to help them in their everyday work to make the right decision (Scapens, 1984; Ashton et al. 1991).

Otley (1980) contended that there is no ideal hypothetical model for Management Accounting Systems similarly appropriate to all organisations in all situations, although neo-classical and economic methodologies assumed that there was an ideal accounting framework plan relevant to the decision making authorities.

Current Management Accounting Systems are often deficient and obsolete for new environments (Kaplan, 1984; 1986; Johnson and Kaplan, 1987). New environments are the consequence of a new business setting and globalisation; including concentrated rivalry, new hierarchical structures, free markets, mergers and acquisitions, open changes and new data innovation. Management Accounting is subsequently, ‘past the point of no return, excessively accumulated and excessively misshaped, making it impossible, to be important for supervisors managing and control choices’, (Johnson and Kaplan, 1987:1p).

Costing records begun to be incorporated into financial records inside an expanded accounting framework (Garner, 1976). Consequently, Management Accounting is being subsumed, in numerous organisations, into management data frameworks. As a consequence of this procedure, management accountants are presently losing their identity and becoming a piece of the larger data management group of the organisation (Ryan and Hobson, 1985).

In the 1980s, the open deliberation on Management Accounting saw conflicts that began by Kaplan (1983) in the USA and Hopwood (1983) in the European Union. Johnson and Kaplan (1987) in their acclaimed book “Significance Lost” suggested that Management Accounting had lost its pertinence. That Management Accounting performances were
becoming subservient to financial accounting practices in order to satisfy outside reporting targets. Management Accounting performances were neglecting to provide leaders with applicable data appropriate for the businesses’ current issues (Johnson and Kaplan, 1987).

Hopwood (1987) disagrees challenging the idea that Management Accounting is static. He believes it has changed and adapted over time to reflect new examples and systems of authoritative exercises and thus is a dynamic and heterogeneous phenomenon that change over time. Management Accounting technologies are crucial in coordinating the constant changes that take place in the business environment (Hopwood, 1983; 1987). He demonstrates that part of Management Accounting is not responsive but rather proactive in moulding the elements of an organisation, particularly in the regions of reappraisal of operation procedures, methodologies and ensuing ramifications for interior productivity and adequacy. Unlike Kaplan (1983), Hopwood expressed that significant advancements were made in Management Accounting systems between the 1950s and the 1960s, a transforming or booming period, that introduced, for example, the zero-budgeting system (Hopwood, 1972).

After the publications by Johnson and Kaplan, numerous writers have supported the idea that traditional organisations need to rethink and retest their current practices as well as supplant them with new practices to confront ecological change. These writers include Chua (1988); Roberts and Scapens (1990); Tayles and Drury (1994); Humphrey and Scapens (1996); Burns et al. (1999). Similarly, the scholars, Bromwich and Bhimani (1989), depicted Management Accounting as being in a state of emergency.

Scapens calls attention to the fact that Management Accounting has changed in spite of the gap between the theory and practice. As a result, there is an absence of understanding from accountants and professionals of existing present day practices (Scapens, 1984; 1985). In line with this context, some 1990's Management Accounting scholars (such as: Innes and Mitchell (1990); Spicer (1992); Collier and Gregory (1995); Burnes (1996); Ezzamel et al. (1996)) realised that too many Management Accounting methodologies are indeed not related to practices in the real world.
In the late 1980s and mid 1990s, Management Accounting specialists have received bits of knowledge from the positive financial methodology (as another side of neoclassical hypothesis) as a consequence of the development of assembling procedures, the unsuccessful endeavours to use a regulating economic methodology (neoclassical hypothesis) to clarify the assortment of Management Accounting performance and in spite of these theories tendencies to overlook inner control issues and hierarchical angles. From one viewpoint, a few specialists utilised organisational theories to open up the ‘black box’ and to investigate new experiences of administrative control inside the organisation (Ezzamel, 1991).

In the 1990s, there was a lot of examination and analysing of contemporary accounting issues. New Management Accounting models, in light of the adjustments in the business environment were presented, including activity based costing (ABC) and action based management (ABM) for instance: Soin et al. (2002); Cooper and Kaplan (1992); etc.

Different scholars criticised the outcome of the examination. Drury (1990), in light of Johnson and Kaplan's ‘significance lost’, expressed that there is no confirmation in accounting literature to show that Management Accounting performances ought to be taken for financial accounting practices; both are distinctive in their goals and purposes. He expressed that analysts have been moderate to react to the impacts of technology because of the lack of adequate research funding. In any case, the research approach started to change to an expanded emphasise on clarifying the practices being used as opposed to creating advanced practices to enhance them (Drury, 1990; Tayles and Drury, 1994; Drury and Tayles, 1995).

Johnson (1992), in his book entitled Relevance Regained, contended that Management Accounting had not lost but rather recaptured its pertinence. He underscores that what strengthens any business in the long run is complete consumer loyalty; subsequently, every organisation must change its methods of working to stay focused in the current worldwide economy. He did not imply that organisations must build up their Management Accounting performances. Organisations needed to expel top-down accounting-based controls. In the meantime, accounting-based control data urges workers
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to control forms for financial results. Global rivalry obliges organisations to adopt
bottom-up data, which enables workers to control various business processes that help
ensure consumer satisfaction.

Success in today's complex and focused business environment relies upon the capacity to
accomplish crucial change. Achievement along these lines depends not on presenting new
frameworks but rather on the capacity to roll out important improvements inside the
association before embracing new frameworks or practices. In this light, Atkinson et al.
(1997) states that new Management Accounting systems have confronted various issues
in their usage, for example, Activity Based Costing. In this way, it is imperative to adjust
new systems to evolving business situations. Scapens and Burns (2000) highlight that
change happens in Management Accounting systems and practices inside the association,
however this change is in techniques utilised, not in embracing new frameworks.

Therefore, management theories and cross-sectional research can recognise the
connections amongst Management Accounting performances and given variables at
specific points in time, without clarifying how these connections occurred. Consequently,
a deeper understanding of how organisations and their frameworks respond to
possibilities has not been developed, responses are still fragmentary and opposing
(Guilding et al. 1998). Clarifications of this nature requires interpretive studies that
comprehend the connections inside the genuine setting over a period of time (Ryan et al.
2002; Scapens et al. 2003; Scapens and Burns, 2000).

Ryan et al. (2002) contend that investigating the performance of Management
Accounting and the growth of new frameworks has inspired specialists. A significant
number of studies have concentrated on depicting the logical relations with Management
Accounting performance with no endeavour to analyse these relations in their setting.
Scapens (1994), in his paper ‘Never Mind the Gap’, described that scholars ought to think
about and decipher Management Accounting performance inside its social context as
opposed to concentrating on the crevice amongst hypothesis and practice. Management
Accounting is socially built and involves an arrangement of standards that might be
regulated and reutilised. Numerous current studies of Management Accounting look at
results and not procedures, with no additional intent to develop current theories (Scapens and Burns, 2000; Scapens et al. 2003). Research is currently more organised to understand the practice, though past research was more concerned with endorsing administrative conduct and creating standardised models (Scapens 2006; Scapens 2008).

In light of those criticisms, Management Accounting analysts have begun to utilise social theories to clarify the relationship that exist within specific organisations in the long term. From one perspective, various Management Accounting scholars have used the hypothesis of structuration to understand Management Accounting performances and frameworks, for instance: Macintosh and Scapens (1990); Macintosh and Scapens (1991); Boland (1996); Barley and Tolbert (1997); Hodgson (1999). However, Giddens created the structuration hypothesis at the end of the 1970s (Giddens, 1984; 1976; 1979), and it focused on testing the cooperation between people's ability to make decisions (Agency) and the multiplication of social structures. Subsequently, it inspects the duality amongst agency and structure (Baxter and Chua, 2003; Hodgson, 1999). In any case, the hypothesis of structuration has had a constrained effect on Management Accounting performances' nature (Baxter and Chua, 2003; Scapens and Macintosh, 1996).

Bowman (1995) contends that Giddens' methodology has had a restricting effect since it disregards verifiable time, and the connection amongst agency and structure cannot be measured without taking the time element into account. Likewise, Scapens (2006; 1994) argues that the structuration hypothesis is not useful for investigating the procedures of Management Accounting.

Then again, a few scholars have chosen Actor Network Theory (ANT) to look at the spread of Management Accounting performances, for instance Tatnall (2010), Alcouffe et al. (2008), Briers and Chua (2001) and Tatnall and Gilding (1999). Actor Network Theory is also referred to as social hypothesis. It was produced by Latour in the mid 1980s and is focused on comprehending accounting's creative dissemination with regards to systems of human and non-human performing factors (or in other words, technological and social components) (Latour, 2005; Latour and Biezunski, 1987).
Actor Network Theory assumes that every factor, both human and non-human (systems), is the same in the network system, and the actor is considered to be the entire network including other sub-components. Henceforth Actor Network Theory looks at every performing actor as a "black box" without dealing with subtle elements. Subsequently, Management Accounting scholars think that it is hard to dissect the components of every element independently in a detailed manner, as it is important to adapt to the infinity network (Latour, 2005; Tatnall and Gilding, 1999). The Actor Network Theory analyses Management Accounting performances or advancements as a "black box" without opening it or giving any consideration on the components (actors) that may influence these developments. It too is unhelpful for clarifying Management Accounting as procedures.

In any case, Scapens (2006), Hodgson (1998) and Hughes (1998) suggested that the different theories mentioned totally neglect an arrangement of presumptions to look at the organisational complexity and real procedures on the grounds that the core suspicions of these hypotheses are grounded in neoclassical economic theory. Additionally, they have concentrated on analysing the dissemination of more refined practices, while achievement implies finding new practices as well as having the capacity to actualise them by rolling out important improvements inside the company (Hardy, 1996).

Anthropological and cultural considerations give us an insightful version of Management Accounting as organised schedules and clarifying of the connection with the social setting (Scapens, 1994). The investigation of organisations is currently seeing a renaissance in sociological aspects (Scapens and Burns, 2000; DiMaggio and Powell, 1991).

As of the late 2000s, Scapens (2004) and other scholars have condemned analysts' reliance on cross-sectional and survey studies (questionnaire) of companies. He urged authors to embrace contextual investigations (case studies) and surveys to analyse Management Accounting performance, expressing that "Contextual investigation (case study) has turned into a mainstream strategy in any accounting study" (ibid.:258p).
Management Accounting systems are socially built (notwithstanding their own technologies). Yet it is critical to analyse them inside their social and authoritative connections (Scapens 2006; Scapens and Burns, 2000). Authors should likewise depict the issues and variables connected with presenting new Management Accounting performances, for example, risk management, activity-based costing (ABC), activity-based management (ABM) and Balanced Scorecard Cost (Kaplan, 1998).

It appears that, up to this point, minimal research has been undertaken regarding the commitments of institutions to an understanding Management Accounting, particularly in new economy businesses (Suutari, 2000; Ter Bogt, 2008). Notwithstanding, institutional hypothesis may give a premise to decipher and break down the components for setting up National Preventive Mechanism remedies, such as examining the impact of the application of a LRIC model on the firms performance in terms of: financial, operational and competitiveness performance by using Steven’s (2007) and Gitman’s (2001) efficient performance accounting measures (metric indicators) - Return on Equity (ROE), Return on Assets (ROA), Return on Sales (ROS) Gross Profit Margin (GPM) - and other indicators for operational and competitiveness performances.

2.4 Understanding The Application of a LRIC Model from Its Antecedents

Telecommunication, gas, electricity, water supply and utility companies are generally considered as natural monopoly industries; that is, industries with falling average and marginal costs due to non-convexities in their production and cost functions, economies of scale and other considerable fixed and sunk costs that marginal costs seem negligible.

The trend is to introduce competition into the provision of utilities, particularly between telecommunications companies. Typically, utility industries have become oligopolies with a few large international incumbent firms that are subject to competition regulations and a regulator with the authority to compel companies to price in such a way as to allow the entry of new firms and prevent collusion and predatory pricing by existing firms or incumbent firms.
This chapter examines the evolution of the pricing methodology for utilities, especially for telecommunications companies. Correct cost measurement is essential in the appropriate pricing of products or services in diverse markets. Therefore, businesses that perform correct cost measurement recognise their importance on the profitability of existing products and in the ways, prospective investments can be made. Costing models and methodologies are key techniques in accounting and financial management. While marginal and incremental cost tools play a vital role in assessing the upcoming production and investment prospects.

In brief, pricing methodology involves regulating companies so that the price according to Long Run Incremental Costs, which is the price according to the Long Run Marginal Cost (LRMC) plus a mark-up or allowance for fixed and sunk costs. Within the literature, these mark-ups are common costs. Much of the debate on LRIC concerns how high common costs should be permitted to account for the necessary reasonable risk related rate of return on invested capital (ROIC) - so that funds are available for continuous investment alongside the evolution of new technologies. As stated by Mason (2008), LRIC is used as a marginal costs assessment criterion in network businesses that usually have huge fixed capital costs proportions. As a rebuttal to this point, Azcoitia et al. (2010) argued that by stating the LRIC can be decided at the most suitable financial standard for measuring the rates offered by businesses who lead the markets (and possibly benefit from price increments and decrements of prices in those markets). Therefore, agreeing with these ideas, it can be argued that a business that focuses mainly on maximising profits will not provide their rates of products or services below the LRIC in the long term; It will instead plan rates on the LRIC costs (Rendon et al. 2009; Lutilsky and Ivic, 2013).

The pricing methodology, LRIC, includes the total service cost of long run incremental costs plus common costs (TSLRIC+) and the total service long run incremental costs (TSLRIC) is different when considering a new firm or existing firm in the same industry.

The hamburger stall example of Sidak and Spuler (1997) clarifies the distinction between incremental costs and common costs. To clarify the notion of incremental costs and
common costs, consider that there is a vendor who sells two commodities (hotdogs and hamburgers). The incremental cost of a hotdog includes the cost of hotdogs, the bun and condiments. While similarly, the incremental cost of hamburgers includes the cost of hamburgers, the bun and condiments. The cost of the grill that is used to cook both hotdogs and hamburgers is considered as a common cost (Cooper, 1987).

The incremental (marginal, variable or additional) cost, of transferring a call from a customer of one telecoms provider, to a customer of another, includes both a (negligible) variable cost to the provider plus an allowance for the opportunity cost of the use of the providers fixed assets. The regulator, concerned with efficiency, must take both into account. He or she must also add a profit margin that is high enough to ensure a fair rate of return to shareholders plus an allowance enabling the firm to invest, yet low enough to allow potential new entrants to hire fixed assets. Essentially, the efficiency concerns are the same if the call is internal to a single provider; this is an issue of shadow or dual pricing.

This thesis draws on a long tradition of cost and cost efficiency analysis in accounting and economics, culminating in the concept of LRIC which is composed of both. LRIC is really a cost plus measure; an attempt to account for true opportunity costs in a situation where the marginal cost, in this case the cost of an additional call, simply as a variable cost is negligible (and falling with respect to the volume of traffic) but when full opportunity costs are taken into account, they are substantial.

Telecommunication is a new economy industry. For the purposes of the thesis, the researcher has focused on the wholesale market; mobile transmission (telecoms) through base stations and switching centres. The thesis concerns the mobile wholesale market in the JTI; transactions between one mobile operator and another. For example, when a customer of Orange calls a customer of Umniah, this involves the use of Orange’s assets by Umniah. The regulator may ask ‘What is the efficient pricing and costing for Orange to adopt?’ Long Run Incremental Costs (LRIC) provides an answer, adopted worldwide in utilities, including telecoms. The thesis uses the term LRIC to cover what the regulator calls Total Service Long-Run Incremental Cost (TSLRIC) and Total Service Long-Run
Incremental Cost Plus (TSLRIC+). The principal concern of the acronyms is the prevalence indeed the dominance of fixed and sunk costs in new economy industries.

**Telecommunications**

Telecommunication markets were formed initially by means of the deregulation of ICT technology power all over the world. The industry was broken into various sub level distinct businesses due to the privatisation and each runs various other sub functions in the industry (Scharnhorst, 2008). Agreeing to the arguments by Pezeshki et al. (2009), telecommunication providers (transmission and distribution) can be considered as regulated businesses as rivalry is not truly reflected. Along similar lines, Gu and Li (2011) argue that regulated businesses such as telecommunications can focus on claiming from users for their facility of the network services as a method of recovering cost.

**Evolution of competitive pricing**

When reviewing the evolution of the idea of competitive pricing in telecoms there are a number of themes that run through the methodology. Firstly, the theme of optimality of marginal cost pricing. Secondly, the problem that arises when the marginal costs fall in such a way that pricing at marginal costs involves losses. The third issue arises if marginal cost pricing is sub optimal - what should the mark-up be? What should the common costs (if using this terminology to cover sunk costs) and fixed costs be? What is a reasonable return on invested capital (Cave, 2004)?

The answer to these questions has evolved over a period of around 150 years. Therefore, the antecedents will be examined under a number of headings.

The first point deals with cost itself, cost being an opportunity cost. The opportunity cost can be seen in terms of the revenue or the profits forgone as a result of making a certain decision. In other terms, opportunity cost could be defined more generally as the loss of utility because one alternative was chosen rather than another. So, the first element of this evolution of the pricing methodology is the idea of opportunity cost, which is a subject matter of the thesis (Cave and Vogelsang, 2003).
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Many general themes run through the evolution of the competitive costing and pricing of utilities over 250 years. This is leads to current debates surrounding many related issues: LRIC pricing; the optimality of marginal cost pricing; the relationship between the optimality of marginal cost pricing and the pair to optimality of prefect competition; the problem of losses that would occur from pricing at marginal cost when average and marginal costs fall due to non convexities - internal (not external) economies of scale; problems arising from externality and public good aspects of utilities; related to this, conflicting stockholder interests and corporate governance issues. There are additionally issues associated with the role of market forces where the industry is dominated by a relatively small number of firms. Issues also arise around the proper role of the state regarding regulation, centralisation, decentralisation and privatisation (Lawrence and Michael, 2001).

The issues in the previous paragraph relate to theoretical issues. Theory informs practice, but can only do so if measurable entities are suggested by theoretical constructs. LRIC pricing also involves implementation issues so there is extensive literature on the practicalities of implementation.

2.4.1 Importance of Costing Principles and Methodologies

The recent study by Brealey (2012) indicates how regulatory cost distribution measures can misrepresent investment and pricing choices in the telecommunication industry. Moreover, he argues that these measures may result in telecommunications businesses selecting distinct subsidiaries instead of focusing themselves as accounting defenders. Even though these rules exist to defend clients from offensive market power and to ensure equality for all competitive service suppliers, it may also lead to a huge cost of regulation. As a rebuttal to this point, it can be argued that moving to price-based regulation from cost-based regulation in monopoly industries by agreeing to recommendations by Brealey there is a necessity to decide on costing principles that affect economic productivity and allow the recognition of possibly offensive behaviours, such as predation and cross-subsidisation (Dugdale and Lyne, 2010; Weygandt et al. 2008). However, if the main regulatory stakeholders feel uncertain about the legitimacy
of the costing principles used by the system, the regulatory proceedings need to be more complex and lengthy than before.

As stated by Datar et al. (2013), where a highly competitive industry such as telecommunication is concerned, prospective new entrants may need to be assured that regulatory procedures never position them at a competitive disadvantage. In the same way, Brealey (2012) states that clients will have new choices (as well as risks), thus they also have a stake in the rules. For an example, if being left without access to vital facilities can stop a prospective new entrant from entering the competitive market there is thus no requirement to beat them in the market. On the other hand, if the business can be controlled using burdensome regulations, it will be difficult for them to enter competitive markets. On these grounds, it can be argued that marketing is not enough to achieve market competition.

One of the more debated and complicated regulatory matters is the continuing discussion about costing principles and methodologies that has been highlighted by a number of authors (Datar et al. 2013; Zimmerman and Yahya-Zadeh, 2011; Dugdale and Lyne, 2010) as these principles can decree the results of regulatory investigations (Stratton et al. 2009; Davies and Crawford, 2011).

Most importantly, the costing role in the telecommunication industry can be considered as both difficult and interesting. As per the literature findings, the New York Public Service Commission is recognised as the very first regulator to focus on the assessment of cost related data and the rate designs in telephone businesses (Economides et al. 2008). However, as stated by Hwang et al. (2010), cost is now recognised as the seventh influential factor in regulatory data. However, there are arguments that can be advanced to support that cost data still has several pitfalls in terms of meaningful interpretation and development (Weygandt et al. 2008; Zimmerman and Yahya-Zadeh, 2011). However, this paper only focuses on costing principles suitable for telecommunications businesses.
2.4.2 Regulatory Concern on Costing Principles

It is useful to examine what causes the relevant authorities to focus more on costing principles in the creation of rules and regulations related to pricing. Woll (2008) states that it can simply be decided as a multidimensional feature and the complexity of businesses; however, Roland (2013) explained the following reasons.

2.4.3 Accomplishment of Economic Productivity

According to the explanations by Flacher and Jennequin (2008), the standard measure for economic productivity or efficiency can be highlighted as zero extra profits in a competitive market wherein rates are focussed to the vicinity of incremental or marginal cost (Kang, 2009). The term "cost" also has been defined precisely by numerous authors (Einhorn, 2012; Macher and Richman, 2008), but this literature discussion will not use the exact meaning of cost and thus cost will be used as an amount of incremental or marginal cost based on accounting definitions (Samoilenko and Osei-Bryson, 2008). On these grounds, it can be argued that rates must be planned to reveal the actual resource costs incurred in making the incremental or marginal unit of the product or service towards efficiency.

Agreeing with Flacher and Jennequin (2008), it is evident that when a price exceeds the marginal cost, it may prevent some market dealings that can give the customer as well as the business a more advantageous or desirable position. On the other hand, when a price is less than the marginal cost, it will prompt over usage of a product or service. For example, some mediators buy the product or service when their estimation on the product or service is lower than the resource cost in making it (Kang, 2009). However, taking a middle-ground position, Einhorn (2012) claims that both circumstances are favourable and hence, from the perspective of economic efficiency or productivity, there is no compelling reason to argue that supposed first-optimal resource provision will be achieved when prices are planned equivalent to incremental cost by supposing that no market drops due to external threats, such as lack of customer awareness or knowledge (Samoilenko and Osei-Bryson, 2008; Katz, 2009).
2.4.4 Fairness and Revenue Sharing Concerns

Egger and Kreickemeier (2012) raised concerns about taxing authority standardisation, stating that regulation planners must maintain standards in developing rules and regulations related to the pricing of services. In addition, Arnold (2008) and Mayer (2015) voiced critical concerns about revenue sharing and the selection of price structure for product lines. It can be argued that taxing authorities have a wide scope in forming public policy that focus more on the interest of the vast majority of society. It is also essential that such policies are equally concerned with the interest of major and minor community groups (Bird and Slack, 2010). As an example, if prices were planned to satisfy the interest of the vast majority of society, authorities would not be able to ensure that everyone has access to it. Thus, the taxing authority must form a basic local pricing policy on businesses to ensure that every individual has the capability to pay and access such a product or service.

Agreeing with Johansson et al. (2008), this scope of equality includes a financial privilege to a service (for example international telephone facility). In such a situation, the specific service has to be well structured and the financial sources have to be recognised correctly in achieving such an objective (Niemann and Shapiro, 2008). According to the views of Okun (2015), another element of equality can be highlighted as equality status quo. Such an objective could be considered as extremely high cost as it lessens efficiency development as well as opportunities (Egger and Kreickemeier, 2012).

From the point of view of cost causality, parties who are responsible for costs must hold the liability of paying costs. In such situations, officials can choose certain rates that are less than the service cost (Okun, 2015). However, it is ineffective practice if there is a lack of awareness or clarity on costs and benefits (Niemann and Shapiro, 2008; Bird and Slack, 2010). Thus, it can be reasoned that service costs are significant in order to recognise what makes the price different from the cost.


2.5 Accounting vs. Economics

Under this section the relationship between marginal costs, pricing, and optimality are discussed. This method of pricing uses optimal situations, looking for the best of all possible worlds, while in reality pricing of utilities involves looking for the best of all actual, not possible, worlds. This section also reviews some of the costing and pricing methodologies related to the subject of the study.

2.5.1 Short Run and Long Run Incremental Cost

Even though this research is mainly focused on the incremental cost, the foregoing debates have also discussed the importance of the marginal cost concept in terms of the business field as well as academically (Kumar et al. 2011; Drury, 2013; Artes, 2009). A key source of discussion and misperception about the marginal cost model is the difference between long run and short run incremental cost and the deciding of which properly measures economic productivity. According to Haynes (2015), long run incremental cost indicates the change in the total costs of business that occurs with a one-unit change of output, when all inputs are impeccably dividable and engaged correctly. On the other hand, short run incremental cost indicates the change in the total costs of the business that occur with a one-unit change of output, when the business cannot diverge into the unit inputs.

It can be noticed that various definitions have been given to short run incremental cost in industrial and academic environments. Academic literature mostly considers short run incremental cost as incremental change (Barnett, 2009; Kumar et al. 2011) while the business environment mostly considers short run incremental cost as change in total costs (Drury, 2013; Artes, 2009). According to the academic literature arguments, total cost of business change is when a change in output occurs. However, input measures cannot be changed. According to business environment arguments, total cost change can be considered when an extra production volume occurs.

However, there has been an inconclusive debate about whether short run incremental cost surpasses long run incremental cost. According to past cases highlighted by several
authors, short run incremental cost surpasses long run incremental cost above specific kinds of output while short run marginal cost is surpassed by long run incremental cost with extra volume (Barnett, 2009; Kumar et al. 2011; Drury, 2013; Artes, 2009; Haynes, 2015).

2.5.2 Industry Example

To help clarify this matter, it is essential to focus on the explanations of short run incremental cost. Furthermore, formal cases from the telecommunications industry can be considered to recognise the practical considerations as well as the theoretical constructs. Assume that three inputs are essential to supply one item of simple domestic telephone service: feeder plant, switching and distribution plant. Every service item needs one feeder, two switching and one distribution plant and input costs can be $2 per one unit of feeder, $3 per one unit of switching and $4 per one unit of distribution plant. Thus, long run incremental cost can be assessed as $12 (Economides et al. 2008).

If capacity of switching is perfectly dividable while distribution and feeder plant have extra capacity, the short run incremental cost can be assessed as $6. There can be some potential customers of this service with corresponding evaluations of $35 (customer 1), $8 (customer 2), $16 (customer 3), $10 (customer 4), $3 (customer 5) and $7 (customer 6). According to the above example, if the price for the service is set according to the long run incremental cost, only customer 1 and 3 will be subscribed and the total cost will be $24. If the price for the service is set according to short run incremental cost, customers from 1 to 5 will be subscribed with the exclusion of customer 5 and the total cost will be $30. Thus, it is questionable whether the best efficiency can be achieved with the price planned according to the short cost (De Bigl and Peitz, 2002).
2.5.3 Understanding Long Run Incremental Cost

As per the above discussion, long run incremental cost can be explained as the resource cost incurred by the business in providing an extra unit of product or service when all inputs are equally dividable and engaged optimally. Thus, when long run marginal cost is used as a benchmark for efficiency, it is achieved when product or service rates reveal the parallel resource cost for providing the next output unit (Heng et al. 2009; Gu et al. 2012).

In such situations, businesses can be operated with extra capacity in some of the sunk inputs. It is not essential to signify to customers that the resource cost is not more than the long run incremental cost. Indeed, inappropriate indications can be sent to customers as they make long run investment choices in long-lasting products or services upon previously low rates. The long run and short run differences cannot be informative for functioning refinements. Partial or full adaptation may deliver the real circumstance more expressively. Full adaptation indicates a situation where the business is making outputs with no sunk inputs (Kaplan and Atkinson, 2015). Agreeing to Gu et al. (2012), this idea matches the long run incremental cost allocation, but then again, it is not inherently interrelated with time.

Partial adaptation indicates a situation where the business has sunk inputs and meets other limitations that need an output creation or production process. If it is not selected it has the capability to adjust clearly to current market circumstances. A partial adaptation involves both production restrictions (such as incapability to practise lowest cost production methods) as well as marginal free inputs (such as sunk costs that are not involved in incremental cost). According to Heng et al. (2009), partial adaptation can make incremental cost methods that are, more or less, full adaptation incremental cost evaluations.

It can be further argued that when rates are planned according to short run incremental cost, they can consist of instability features that pose organisational problems for both manufacturers and consumers (Porter and Kramer, 2011; Gu and Li, 2009). On these grounds, it can be argued that it may be practical to plan rates upon the long run marginal
cost. On the other hand, Edward Park discovers that variable rates (replicating short run circumstances) can provide considerable productivity improvements in some circumstances of awkward telecommunication investments. The income necessity limitation results in the productivity improvements being approved to customers (Porter and Kramer, 2011).

According to the previously example given above, supporters of long run incremental cost could seemingly claim that rates must not be planned less than $12. Therefore, agreeing to that standard, only customers 1 and 3 would be provided with the telephone service. For capacity planning objectives, projected future usage relies on the predicted rate, and a rate replicating simply short run incremental costs might encourage extreme capacity investment to fulfil the required capacity. On the other hand, once the lump-filled investment is done, the sunk costs can be discounted for objectives of indicating extra usage at that time (Porter and Kramer, 2011). As highlighted in a previous section in this chapter, there is no compelling reason to argue that letting pricing variability and replicating short run concerns can improve economic efficiency.

2.6 Marginal Cost Pricing – Efficiency

2.6.1 Marginal Cost vs. Average Cost

There is a long tradition in literature of the discussion of efficient costing and pricing. Roy Harrod (1931) and Jacob Viner (1931) explained this by using diagrams to show the relationship between the Long Run Average Cost (LRAC) curve, Short Run Average Cost (SRAC) curve and the difference between AC rule and MC rule for costing and pricing. Harrod (1959) to describe the LRAC curve as an envelope.

The figures (7, 8 and 9) show the LRMC, SMC, LAC and SRAC curves:
**Figure 7: The LRAC Curve and SRAC Curve**

LRAC curve is an enveloping curve that contains the SRAC curves. A points to the increasing returns to scale, while B points to the constant returns to scale and C points to the decreasing returns to scale as exhibited points in the figure. **Source: Kahn A. E (1988).**

**Figure 8: The LRMC, SMC, LAC and SRAC Curves**

LRAC curve is an enveloping that curve contains the SRAC curves. A points to the Increasing returns to scale, while B points to the constant returns to scale and C points to the decreasing returns to scale as exhibited points in the figure. **Source: Kahn A. E (1988).**
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2.6.2 Ideal and Efficient Price (LRMC=P)

Economically, the MC rule is an optimal approach. Therefore, marginal cost is the most efficient pricing method from the viewpoint of economists. However, the Long Run Marginal Cost (LRMC) rule is considered the benchmark, while the ideal efficient price equals (LRMC).

Marginal cost is the main subsidiary of a company’s cost of production capacity. In any case, its practical application includes the estimation of the adjustment in a company's expenses (costs) for production when its yield changes by a predetermined increment and is regularly referred to as incremental costs or avoidable costs (where the predefined change includes a diminishment in yield) (Winter, 1994b). This study takes the opinion of the ideas supporting marginal, incremental and avoidable costs to be the same, since their distinctions have no impact on the issues studied.

At least one of the production factors should be fixed in the short run, such as a company not quickly adding new creation to its production lines. It is unrealistic for a company to increase the amount of a product that it is supplying by extending its current limit (Crandall and Sidak, 2004). There is a way that a company can expand supply i.e. to utilise their current limit to generate more with what they now have. Therefore, Short Run Marginal Cost can be considered as the cost of meeting the increase in demand (incremental change), while stabilising the company's capacities.

This is frequently understood as the working and support costs connected with supplying the product. Now and again, that can be true, however not generally. At the point when an incremental change in demand can be achieved by expanding the supply from existing company's capacities, the SRMC will be equivalent to the working and marginal costs connected with delivering those extra units. Be that as it may, at different times, SRMC can effectively be over the negligible working and support uses brought about when serving incremental interest (Steven, 2007). In particular, a vital yet frequently ignored component of SRMC is that, on the occasion that supply cannot grow to match the incremental change sought, SRMC ascends to whatever level is important to matching demand with supply (ibid.).
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In particular, in circumstances where there is an expanded risk of deficiencies, the expenses connected with this demand portion can make SRMC transcend variable expenses. Significantly, it is amid these lacking times that organisations can make a commitment to their settled costs, which do not change with yield over the transient and are in this way not a segment of SRMC (Kahn 1988).

Figure 9: Long Run Marginal Cost Curve

2.7 Opportunity Cost Concept and New Economy Industries

Traditionally, in new economy industries the MC of a service is negligible compared to fixed costs (opportunity cost), which are important for reinvestment in fixed assets and facilitates the ability to keep a pace with rapidly moving technological changes. Therefore, opportunity costs should be substituted or added to the marginal cost pricing to be more fair and reasonable (Coase, 1946).

The objective opportunity cost developed by the Austrian Wieser 1884; 1889, (but also Menger and Böhm-Bawerk), define the cost of a product as the objective market value of an alternative product that could have been produced with the same resources. This opportunity cost is, therefore, equal to a market price determined by marginal utilities; it
depends on subjective evaluations - this is the subjective theory of value, also developed by Jevons and Walras. But the opportunity cost defined as a price, is objective in the sense that it is measurable by an external observer. At equilibrium, this objective opportunity cost (OOC) is equal to money outlays since the price of the alternative product is reflected in the price of the resources (Buchanan, 1969, 3.10).

The opportunity cost is the value of the second best option, in a circumstance in which a decision should be made between a few totally unrelated choices given restricted resources. Expecting the best decision is made, this is the "cost" acquired by not liking the advantage that would have existed by choosing the second best decision (Thierer, 1994). More to the context, the new Oxford dictionary (1999) characterises it as 'the loss of potential increase from different choices when one option is picked'. Opportunity cost is a main concept in finance and economics, and has been portrayed as communicating 'the essential relationship amongst shortage and decision' as defined by Advanced Learner's Dictionary (Fourth Edition) Oxford dictionary (1999) (Pearsall, 1999). The concept of opportunity cost has a key impact in guaranteeing that rare assets are utilised proficiently. In this way, opportunity cost is not confined to monetary costs: the genuine cost of yield renounced, lost time, delight or whatever other advantage that gives utility ought to be considered as opportunity costs.

In financial and economic matters, a Production-Possibility Frontier (PPF) or ‘transformation curve’ is a diagram that demonstrates the distinctive rates of production of two merchandises that an individual or team can effectively generate with restricted gainful assets (ibid.). The PPF demonstrates the most extreme possible measure of one item for any given measure of another product or composite of all different products, given innovation and the measure of elements of production accessible.

Here is a case utilising two merchandise, Food and Personal Computers (PCs):

\[\text{THE EVOLUTION OF THE LRIC PRICING MODEL; LITERATURE REVIEW}\]
The shift from point A towards point B shows an expansion in the quantity of PCs delivered, however, it additionally demonstrates a diminishing measure of food created. Accepting that profitable assets do not build, making more PCs requires that assets be diverted from making food to making PCs. On the off chance that production is proficient, $F_A$ of sustenance and $C_A$ of PCs could be made (as Point A indicates), or $F_B$ of food and $C_B$ of PCs could be formed (as Point B appears). All points on the curve are the most extreme production effectiveness; all points inside the curve are achievable, however, profitably inefficient and all points outside the frontier are infeasible for particular resources.

On the off chance that there is no expansion in beneficial resources, expanding production of a product involves diminishing the creation of a second product, since assets must be exchanged from the second product to the first. Points along the frontier portray the exchange between the products (Roberts and Scapens, 1985). The sacrifice in producing the second product is known as the "opportunity cost" (on the grounds that the chance to produce the first product involves the cost of diminishing the second). Opportunity cost can be measured in the quantity of units of the second product that are not produced if an extra unit of the first product is produced (ibid.).

* Source: Geoff Riley, 23 September, 2012.
Therefore, what is the efficient price? The efficient price should be low enough to make entry possible for the potential investors (new entrants) as well as high enough to make a contribution of fixed costs (opportunity cost) and to get a sufficient return to give funds for new investments (new capacities, new fixed assets) to the incumbent.

The productive price is the point where demand and supply are in harmony. Above all else, it needs to consider the business sector structure, under pure competition, and next it cannot have economies of scale. A firm at pure competition delivers an amount of goods units where marginal cost must be equivalent to average total cost and this must also break even with the price at the end of production (P=MC=ATC).

This implies, at this level, customers will purchase and manufacturers will create (Turney and Stratton, 1992). In this way, at this level of price, supply as well as demand will be in harmony and there will not be any producer or customer surplus.

2.7.1 ECPR and Opportunity Cost

Willig (1979) and Baumol (1983) presented Baumal-Willig's efficient component pricing rule (ECPR), pointing out that the efficient price should equal the direct cost plus the opportunity cost to the services provider. Baumol and Sidak (1994) then explained the ECPR in more detail. It is known by an assortment of names: (ECPR), the efficient component pricing rule, the Baumol/Willig guideline and the equality principle.

The ECPR is for valuing intermediate services given by the incumbent, however, adversaries require that the transitional service be estimated on the premise of the average incremental cost of the intermediate goods, in addition to the opportunity cost for the loss of some market share. The Baumol/Willig principle states that the intermediate service ought to be sold at its average incremental cost (AIC), it is contestability comparable to marginal cost, including opportunity cost (Brealey, 2012).

The idea behind the "efficient-component pricing rule", is that the company that offers intermediate goods to its opponents must get the total of the marginal cost required to generate the goods the meaning of AIC to any inevitable income as a consequence of the loss of share of market to the adversary - which is the opportunity cost connected with the
service. The competitor is presumed to produce an identical end-product, yet requires the intermediate goods from the incumbent for some commodity parts. The majority of the commitment lost by the incumbent must be paid by the competitor under the ECPR (ibid.). This makes many uncomfortable, yet the rationale is sound. Be that as it may, the suppositions and conclusions don't hold. The model does not analyse progressively as things change, as most models, so it breaks down (Wieser, 1889).

2.7.2 Critical Assumptions of The ECPR

The pricing of the incumbent firm should be exact. The opportunity cost does exclude any monopoly rents related with the service. The moderate goods sold are substituted one-for-one for the intermediate items of the incumbent firm (Baumol and Sidak, 1994b).

2.7.3 LRIC Vs. ECPR

Armstrong et al. (1996) studied LRIC models methodology as the latest development of the Boumal-Willig efficient component-pricing rule (ECPR) as both of them are based on cost and the use of an efficient network. Pricing that is cost based is incorrect and that must be considered in deciding the interconnection rates (ibid). The ECPR is not to simply to decide when the contestability presumption is casual. Without a doubt, while the ECPR is a valuable benchmark, as per Armstrong et al. (1996), as it can be consolidated into the examination of the optimal value, it requests as much data as the Ramsey model (Wieser, 1889).

The marginal costs, elasticity of demand, cross-elasticity and demand are required to set the structure of optimal price (Baumol and Sidak, 1994b). The treatment of the intermediate product’s price is one of the prices to improve final products, as in the worldwide price-caps that is developed by Laffont and Tirole (1995), offers helpful experiences into the issues. It shows the contortions presented by partial price caps.

Using the global price cap does not mean that all issues are solved; the customary regulatory issues remain - the data asymmetries among the authority commission and companies, along with the risk that the commission can be "captured" by the company it
is charged with monitoring. The models have not tested the dynamic parts of these techniques.

Armstrong et al. (1996) unravelled the idea of no other options, homogeneous items, and substitution likelihoods. Utilising an extended meaning of opportunity cost, they demonstrate that the opportunity cost is lower than the benchmark case, as previously expressed. Along these lines, while the opportunity cost ought to be considered in setting access prices, these costs are not identified in the basic methodology that is described by the ECPR under contestability conditions; however, it incorporates or is reliant on the cost elasticity and demand. Indeed, Armstrong et al. (1996) demonstrate that “.. at the point when the access charge and the retail price are set ideally, the access price ought to . . . be more prominent than inferred by the ECPR yet . . . less than the price determined by the incumbent when allowed to put its own access price . . .” (Armstrong et al. 1996:368p).

2.7.4 LRIC-based Price is the Efficient Price

New economy firms such as telecommunications are characterised by falling average and marginal costs. LRIC pricing is a way of handling the problems of falling average and marginal cost industries where pricing according to long run marginal costs involves losses.

Practically, there is a solution to solve this issue that is the measuring of marginal cost over the long term, considering the fixed costs of a specific service, and to characterise bigger increments with a specific end goal of representing the cost impacts of joint production in addition to scale economies (Veronese and Pesendorfer, 2009). Calculating the Long Run Incremental Costs (LRIC) is one way of solving this problem. However, the LRIC model is the latest development of the LRMC rule (Veronese and Pesendorfer, 2009).

The long-run marginal cost curve shows for every unit of yield the additional total cost acquired over the long haul; that is, the reasonable period when all elements of production are variable so as to minimise the long-run average total cost. Wicksteed,
(1914) expressed instead that the LRMC is the base increment in total cost connected with an increment of one unit of yield when all inputs are not fixed and therefore, variable (ibid.).

**Figure 11: The Long-Run Marginal cost Curve**

![Graph of Long-Run Marginal and Average Cost Curves](image)

*Source: Boyd and Boyd (1994)*

Looking at figure (11), it is obvious that the long run marginal cost curve along with the long run average total cost curve demonstrates the same conduct as the short run marginal cost curve connected with the short run average total cost curve. Thus, the length of the average cost curve is falling with the expansion in yield and the curve of marginal cost lies beneath the curve of average cost.

At the point when average total cost curve starts to rise, marginal cost curve likewise rises and goes through the minimum purpose of the average total cost curve and afterward rises (Viner, 1931). The main distinction between the short run and long run average costs and marginal costs is that in the short run, the fall and ascent of LRMC curves is sharp. While over the long run, the cost curves drop and rise consistently.

The long-run marginal cost curve is formed by, a long-run idea as opposed to the law of reducing marginal returns, which is a short-run idea. The long-run marginal cost curve has a tendency to compliment than of its short-run collaborator because it has extended available information and adaptability for cost minimisation. The long-run marginal cost meets the long-run average cost curve at the minimum point last mentioned (Vogelsang,
At the point when long-run marginal costs are beneath long-run average costs, long-run average expenses are falling (with extra units of yield). At the point when long-run marginal costs are above long-run average costs, average costs are rising. Long-run marginal cost measures up to short run marginal-cost. LRMC is the incline of the LR capacity of total cost (ibid.).

2.7.5 Competitive Market and the Evolution of the LRIC Model

The idea that a deadweight loss is incurred in cases of monopolies is the reason for introducing regulation and competition into telecommunications industries. However, telecommunication organisations are deregulated as oligopolies and have a barrier to entry that leads to contestable market issues.

Therefore, the adoption of LRIC models is suitable especially for newly privatised utilities, particularly for those with high fixed cost and rapid technological changes, as well as to encourage competition between incumbent and new entrants. Furthermore, to protect consumers’ interests, to let service providers get a return sufficient to cover their future investments on fixed assets (new capacities), as well as to make it possible for prospective investors to enter competitive markets.

Gabel and Rosenbaum (2000) pointed out that the Federal Communications Commission (FCC) adoption of the Total Element LRIC (TELRIC) model has promoted competition between incumbent local exchange carriers (ILEC) and new entrants. The TSLRIC method can be introduced as a financial technique for the estimation of cost focused valuing that depends on the forward-looking expenses of the total quantity of the amenities and processes in the long term that are attributable openly to, or sensibly recognisable as incremental to the service, while taking into consideration the service supplier’s facility of other communication facilities. Additionally, the TSLRIC comprises of a practical provision of forward-looking shared expenses (Rodriguez de Lope et al. 2008).

Crandall and Sidak (2004) concluded that to remove any perverse incentives for investment, the rates of interconnection must exceed marginal cost. In other words,
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TELRIC-based rates would be more efficient, more reasonable and more accurate if these rates were equal to the mark-up over marginal cost or if these rates were equal to the TELRIC plus an appropriate fixed and common cost for all the interconnection services.

Farahani and Manjappa (2008) found that when competition increased in the mobile market, the prices of the mobile services decreased according to the demand in the mobile market. Moreover, empirical analysis mentioned that the market structure is far from competitive and is not related to it. The LRIC system has additionally been criticised for believing that systems could be quickly recreated with forward looking innovation.

In a fully competitive business sector, entry would happen until costs were driven down to these LRIC prices. What is not clear is whether an endeavour has been made to gauge LRIC, using a reasonable risks balanced rate of profit for resources or suitable financial measures of depreciation. There is a long tradition of marginal economics, but there is also a parallel tradition of mark-up pricing and another that says that perhaps companies do not know what their marginal average costs are (Economides et al., 2008).

2.8 Conclusion

This chapter provided an overview of management accounting in terms of: its nature, definitions, functions and the historical background of management accounting and its relationship with economics, followed by an historical overview of the Long-Run Incremental Cost (LRIC) pricing model, reviewing the evolution of LRIC models by drawing on its long tradition in economics and linking the model with the Long Run Marginal Cost (LRMC). Next, different viewpoints of costing and pricing methodologies according to accounting and economics principles are explored. Some related issues such as: marginal cost, efficiency, regulation, new entrants and incumbents are outlined. This chapter ends with a literature review that begins with Adam Smith Smith’s Deer – Beaver model (1770’s) and then exploring later periods that relate to new economy businesses using the LRIC pricing methodology.
CHAPTER THREE
THE JORDANIAN TELECOMMUNICATIONS INDUSTRY

Overview

This chapter provides background information on the JTI and analyses network pricing used in the therein. This chapter reviews the development of the JTI and presents the structure of the Jordanian telecommunications markets, in terms of the three telecommunications services providers Orange, Umniah and Zain. Additionally, the role of the Jordanian telecommunications regulator - TRC is outlined. Finally, towards the end of this chapter, the impact of the telecommunications sector on the Jordanian Economy is summarised.

3.1 The Research Context; Jordan

Jordan is an emerging country and its economy is characterised as a free-market, as a result, the vast majority of the Jordanian utilities are liberalised and privatised, including the telecommunications industry. Similar to other developing states, Jordan has confronted considerable environmental challenges during the last two decades. These difficulties are compounded by a shortage of natural resources, extensive budget shortfalls, high levels of public debt, unprecedented levels of unemployment, high taxes, falling quality of public administration and the bureaucracy of public sector administration. The Jordanian regime and its geographical location has helped Jordan develop good relationships with the United States of America and the European Union, evidenced through international support.

In 2005, Jordan issued the National Agenda, which pushed the agenda or developing a modern state by addressing the difficulties confronting the kingdom. The intention of the National Agenda (NA) was to accomplish advancement by executing different open division and monetary changes, and with the backing of international contributors and advisors, to set Jordan on a path towards financial and political improvement. This prompted change in the bureaucracy of the public sector administration and new public
management regulation. The adjustment in the Jordanian open division towards new public management was underway by 2008, particularly after the introduction of the managing for results' methodology, which covered budgeting frameworks, for instance: the launch of Results-Oriented Budget in 2008 and Government Financial Management Information in 2010.

3.1.2 Jordanian History at a Glance

In the sixteenth century, Jordan surrendered to the Muslim Ottoman Empire and was ruled from Damascus. After World War I, Jordan was a British colony for 27 years up to 1918, Jordan (then known as Transjordan) was isolated from Palestine in 1920, and in 1921 was put under the tenet of Amir Abdullah I bin Al-Hussein. After World War II, Jordan became an independent country, however, stayed under the sponsorship of Britain. During the early years it was a fragile state, because of the death of its ruler Amir Abdullah in 1947, and because the illness of King Talal. Talal's child, his successor, Hussein was born in 1935. Many contend that Jordan really became independent when King Hussein became King of Jordan in 1952 (Al-Hyari, 2009).

King Hussein ruled Jordan for a long period from 1953-1999, a practical pioneer who addressed opposing pressures on local and international fronts. Jordan has confronted various difficulties to its advancement; there is a general absence of natural assets and the Kingdom has endured the impact of Israeli occupation twice - the first occupation for Palestine was in 1948 while the second for the West Bank was in 1967- which before this was part of Jordan. The Kingdom witnessed the first parliamentary elections and politician change and economic reforms started in 1989 (CIA, 2012). From 1989 to 2015, Jordan held eight free and fair parliamentary races. Al-Shiab (2003) points out that since 1989, political reforms and financial changes have emphasised; democratic practises in Jordan, privatisation, monetary liberalisation, social agreement, security and currency. In fact, all these steps were taken in response to the depreciation of the Jordanian currency (Dinar) in 1988 and in 1990 after the Gulf Crisis.

In 1999, King Abdullah the second became King of Jordan – following the death of his father King Hussein. King Abdullah prompted the government to adopt new financial
remedies and political change. He requested that the government issue new laws, such as, the free zones, speculation advancement law and privatisation law. Under his initiatives the government has been able to use international approaches to deal with the economy through privatisation plans. The World Bank (2008) reported that in 2000, Jordan became a member of the World Trade Organisation (WTO) and signed Free Trade Agreements (FTAs) with the USA and a year later Jordan FTAs with the European Free Trade Association (EFTA). Regionally, Jordan is a member of the Greater Arab Free Trade Area (GAFTA). Roughly, 75% percent of Jordan’s exported goods are to FTA partners.

Under the guidance of the King Abdullah, the government has strived to implement long term objectives for monetary reform, political change and genuine law based changes. To expand its social welfare, Jordan is pushing a system of private sector open economic development. The ambition of King Abdullah II is to achieve reasonable advancement and has therefore, launched an award for governmental performance and transparency. Without national support, change agenda would have minimal chance of success. There are a few obstacles in the way, obsolete organisations and laws that manage government and semi legislative organisations and control and hinder advancement.

After the Arab Spring in 2011, particularly the clashes in Egypt and Syria, the political response in Jordan greatly impacted the Jordanian economy. Furthermore, there was obvious discontent with the government and clashes in various regions of Jordan, particularly in Amman the capital. There was a push in the administration to speed up political and monetary reform to limit dissent against the government because of budget shortfall, high rates of unemployment and high rates of inflation. At this time, King Abdullah changed the government many times and formed two commissions, the first one to make changes to the elective law and trade union laws, and the second to consider statutory revisions. Thus many monetary and political changes have been executed by the successive governments (CIA, 2012).
3.1.3 Jordanian Economy and its Challenges

The economy in Jordan is considered an open economy, despite being one of the smallest when compared to other Middle Eastern economies and the fact that Jordan’s economy is restricted by a lack of natural resources. The economy of Jordan, therefore, depends on some internal financial resources, for instance; returns from taxation and customs tariffs, returns on exported goods and some external investments, while the external financial resources are; external loans, external subsidies and monetary transfers of overseas workers. The fundamental interior sources of national wage are traditions and assessments incomes, Jordanian fares, and outside ventures (International Monetary Fund, 2004).

During the 1970s and 1980s, Jordan encountered a boom in financial development as a consequence of increasing oil prices. The financial development proceeded until the financial crisis in 1988, which brought about a Jordanian currency devaluation, and increasing oil prices, which caused a significant deceleration in the Jordanian economy. To help recover the collapsed economy, the government at that time, obtained international loans over long periods of time. Jordan has since battled with the significant obligation of huge debts and unemployment since 1988. In 1989, this eventually prompted a genuine monetary crisis. The key barriers to Jordan's economy are a sporadic water supply, a dependence on importing oil and the security instability of the whole region (Economic Reforms, 2012).

Al-Hyari (2009) pointed that despite the economy of Jordan being based on business sectors and markets, it is impeded by an extreme lack of natural resources. The key normal resources in Jordan are: phosphate, concrete and potash, this can illustrate the huge amount of deficit in trade balance and the consistent shortfall in its exchange parity. More to the point, CIA (2012) added that there are other monetary difficulties that the Jordanian government faces such as: consistent high rates of poverty, increasing rates of inflation, a unemployment and a huge deficit in the trade balance. Al-Hyari (2009) emphasised the large shortages in the budget and trade balance, but noted that its proportion to GDP has decreased. This was because of a slight decrease in the rate of
development of imports and a steady expansion of local production, which mirrored a positive development in the Jordanian economy.

As mentioned before the Jordanian economy is based on markets rather than industries as in the case of British and American economies. Jordan, it is endeavouring to encourage industrialised by urging small and intermediate producers to export goods outside the Kingdom as a method of expanding their bases, this can ultimately decrease rates of unemployment and increase tax and customs tariffs and as a result will also decrease the deficit in the trade balance. In the meantime, the worldwide financial deceleration and provincial turmoil have additionally discouraged Jordan's GDP development and other financial indicators. The table below shows the vacillations (irregular characteristics) of monetary indicators including budget shortage, imports and export, outside speculations, external loans, rates of inflation and unemployment and general public debit indicators.
Despite the undeniable achievements of the change in policy, the table (1) demonstrates that the Kingdom continues to face various monetary and social difficulties, for example, a high financial deficiency of around 9% in 2010 with general debt of more than 70% as a percentage of GDP in 2010, which undermines the rate of development. Outer subsidies are indispensable and financial development barely increases employment. The rates of unemployment are high in the Kingdom, especially among young people. The monetary transfers of overseas workers (more than 20% as a percentage of GDP) have empowered Jordan to fund levels of investment far in excess of what is supportable by local revenue. Imports of raw petroleum is a considerable burden on the Jordanian economy and on its restricted foreign monetary exchanges. The Kingdom has generous stores of phosphates.

Table 1: The indicators of the Jordanian Economy over the period 2007-2010

<table>
<thead>
<tr>
<th>Economic Indicators</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP (Million $)</td>
<td>17765.4</td>
<td>22698.9</td>
<td>25082.3</td>
<td>27573.5</td>
</tr>
<tr>
<td>GDP Growth (%)</td>
<td>8.5</td>
<td>7.6</td>
<td>2.3</td>
<td>3.1</td>
</tr>
<tr>
<td>Inflation - CPI (%)</td>
<td>3.4</td>
<td>14.9</td>
<td>-0.7</td>
<td>5.0</td>
</tr>
<tr>
<td>Unemployment (%)</td>
<td>13.1</td>
<td>12.7</td>
<td>12.9</td>
<td>15.5</td>
</tr>
<tr>
<td>Foreign Direct Investment (as a percentage of GDP)</td>
<td>14.8</td>
<td>12.5</td>
<td>9.7</td>
<td>6.2</td>
</tr>
<tr>
<td>Workers’ remittances (as a percentage of GDP)</td>
<td>19.3</td>
<td>16.72</td>
<td>14.34</td>
<td>13.2</td>
</tr>
<tr>
<td>Export Growth (%)</td>
<td>2.3</td>
<td>-12.1</td>
<td>-2.7</td>
<td>7.6</td>
</tr>
<tr>
<td>Import Growth (%)</td>
<td>6.4</td>
<td>3.1</td>
<td>-7.8</td>
<td>7.1</td>
</tr>
<tr>
<td>Current Account Balance (Million $)</td>
<td>-2874.8</td>
<td>-2038.1</td>
<td>-1125.5</td>
<td>-1311.5</td>
</tr>
<tr>
<td>Public Debt (as a percentage of GDP)</td>
<td>71.0</td>
<td>58.1</td>
<td>61.4</td>
<td>70.0</td>
</tr>
<tr>
<td>External Debt (Million $)</td>
<td>8371.1</td>
<td>6579.9</td>
<td>6615.0</td>
<td>7821.8</td>
</tr>
<tr>
<td>Total Debt Service (Million $)</td>
<td>769.6</td>
<td>2703.1</td>
<td>584.7</td>
<td>653.3</td>
</tr>
<tr>
<td>Cash Surplus or Deficit (as a percentage of GDP)</td>
<td>-4.5</td>
<td>-2.1</td>
<td>-8.5</td>
<td>-9</td>
</tr>
<tr>
<td>Customs and Tax Revenues (as a percentage of GDP)</td>
<td>29.9</td>
<td>28.1</td>
<td>24.8</td>
<td>22.7</td>
</tr>
<tr>
<td>Government Consumption (as a percentage of GDP)</td>
<td>23.3</td>
<td>23.6</td>
<td>23.5</td>
<td>21.4</td>
</tr>
<tr>
<td>Public Expenditure on Education (as a percentage of GDP)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Public Expenditure on Health (as a percentage of GDP)</td>
<td>8.6</td>
<td>9.4</td>
<td>9.3</td>
<td>-</td>
</tr>
<tr>
<td>R&amp;D Expenditure (as a percentage of GDP)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Military Expenditure (as a percentage of GDP)</td>
<td>6.1</td>
<td>6.3</td>
<td>6.1</td>
<td>-</td>
</tr>
</tbody>
</table>

and potash. These items are, just such as the case for other crude materials, liable to value variances and temperamental interest. Jordan additionally experiences a constant water deficiency and is helpless against dry seasons, and a lot of its land is excessively arid for farming (El-Sakka, 2007).

Al-Hyari (2009) argued that there has been a shortfall in the exchange parity and budget subsequent to the foundation of the Kingdom. The budget deficiency began to increment again from 2011-2012, reaching more than 10% as a percentage of GDP. The trade balance stayed exceptionally unstable from 2011-2012, albeit the levels of foreign cash stayed sufficiently high to protect against fleeting vacillations. The indicators explained previously adversely influenced the performance of the Jordanian economy, as the shortfall in the trade balance and the related current record shortage changed Jordan from a closed economy with complicated organisation in the1980s and 1990s to a more open economy and national performance management tenets by the 2000s. These macroeconomic measures have put financial and political issues at the forefront for the state and have permitted it to stay on a path to real change. To handle the disparity, the Jordanian government has received a financial reforming schedule subsequent to 1989, bolstered by the World Bank and the International Monetary Fund. The financial reform schedule has contributed fundamentally to diminishing macroeconomic unease, bringing about development performance in GDP with an expanded role for the private segment in the economy.

Outside confidence in the budget stays considerable. The components of the Jordanian budget comprise essentially of direct subsidies and direct loans from global and provincial granting authorities. From one perspective, expanding levels of Arab subsidies seem, by all accounts, to be identified with intra-Arab contentions and this can support the preservation of the situation in the region; another perspective, that subsidies from western governments is contingent upon political reforms and initiation of the democratic process, markets liberalisation, financial changes and the upgraded proficiency of governmental regulatory towards national performance management considerations (CIA, 2012). CIA (2012) added that such changes based on loaning authorities focus on building up a liberalised business sector economy and fully competitive markets.
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Moreover, macroeconomic arrangements are generally affected by the Jordanian central bank's obligations to maintain the stability of exchange rates with the U.S. dollar; hence, the central bank has been successful in maintaining the economic situation in Jordan. In contrast, there are a few oligopoly issues in Jordanian industries remaining unresolved by the Jordanian government, and obstruction to new policies in many financial areas.

Generally, worldwide organisations and lenders have recognised that the Jordanian Kingdom utilises its limited resources in moderately and efficiently. Jordan occupied the intermediary rank of the third upper quartile of the World Bank report with regards to Governance indicators, showing an upward trend from following 2007. Despite the fact that various new businesses and markets have been built and change strategies achieved under the direction of worldwide lending authorities, still there are various limitations remaining. Specifically, nepotism and prejudice have a powerful role to play in hiring new workers in open organisation. Major secondary triggers and rising global prices have prompted dynamically increasing budget deficiencies since 2008, in spite of the fact that the Jordanian government has endeavoured to raise domestic incomes and limit expenses. While budget deficiencies stay a continuous issue, the Jordanian government has achieved some success in enhancing efficient resources productivity use through removing subsidies for oil derivatives and energy sources and by supporting alternative energy sources through exempting the relevant imported goods from tax and customs tariffs (CIA, 2012).

The Jordanian government has run huge budget shortfalls that have prompted increasing levels of indebtedness, consequently upsetting its capacity to invest in change. The Jordanian government issued a National Agenda in their efforts to handle such difficulties. A royal decree launched the National Agenda in the 2005. The National Agenda guarantees a procedure of national cooperation by including partners from different segments of the Jordanian community with the purpose of accomplishing a reasonable circulation of normal social advantages, monetary corrections and political changes (NA, 2005). A definitive goal of the National Agenda is to accomplish practical improvement through a change program that will put Jordan on the direction of financial development, public consideration, social justice, monetary reforms and political
advancement. The NA will assess and control development by relevant performance indicators (NA, 2005:4p).

Cassing and Salameh (2006) argued that with the expectation to address these difficulties and to take advantage of the open doors created by the National Agenda, the government has reformed and updated its administration and budgeting framework to be more centred around findings. Thus development has tended to be higher, external investment has increased, and the rates of poverty and unemployment has been lowered. The Jordanian government has strived to facilitate different goals and advantages; however, it has been just barely fruitful in this mission. In the course of the most recent decade, a limited number of activities associated with public management and monetary change, including Results-Oriented Budget and Government Financial Management Information System strategies have been adopted under the National Agenda and National Performance Management. These frameworks address a broader issue of strategy harmonisation. As of 2011, the Jordanian government presented two financial aid bundles and a budgetary upgrade, to a great extent to enhance the living situations for the poor and middle income sector.

3.2 Political and Economic Reforms

The limitations and difficulties in the Jordanian political and financial scene made the need for reform at a public level a matter of urgency, which constrained the government in setting standards for viable financial administration in public organisations. The political reforms and monetary changes were initiated by concentrating principally on the Managing For Results Approach, which mirrored general management, which is part of the financial change. These change strategies were created by the administration to focus on the execution of the management accounting frameworks, particularly budgeting frameworks (i.e. Results-Oriented Budget and Government Financial Management Information System). The governmental corrections procedures can be separated into two phases: outside activities conducted by the International Monetary Fund, which occurred somewhere around 1989 and 2004, and inside activities undertaken by the Jordanian government itself that began in 2005. The accompanying areas clarify the relationship
between the change procedure because of dangers and challenges and the presentation of the National Agenda.

3.2.1. The Reform Path and its History

Since the 1980s, Jordan's macroeconomic challenges threatened to tear apart the economy of the Kingdom. This was accompanied by difficulties such as indebtedness, budget reductions and rescheduling the public debit. These difficulties culminated in 1989 and as a result, Jordan began adopting monetary conformity strategies in participation with the International Monetary Fund and the World Bank. Harrigan et al. (2006) pointed out that this was the first collaborative step between Jordan and the International Monetary Fund with the purpose of adopting an associated monetary change project to re-build a financial development framework. The project took place from 1989-1992, and incorporated a steady easing in monetary consumption, evacuation of exchange obstructions, and the removal of the subsidy on all the essential commodities. It prompted major reforms in monetary and community routines, which was the common standard in the behaviour and thinking about the legislature for a considerable length of time. According to the Economic Reforms (2012), the political change process that started in 1989, when the first parliamentary races were conducted after a delay of more than thirty years, in concurrence with a time of community unrest and frail monetary attitude. Accordingly, the continuity of parliamentary practices exemplified another popularity based move, which has started to be considered in the course of the most recent decade by implementing financial, political, regulatory and legal changes, with a strong commitment to ensure balance, and to consolidate the foundations of equality and human rights, including the protection of the right of expression. The democratic procedures that were slowly actualised took into consideration political reforms and a developmental change from political practices following 1992 by issuing special laws dealing with licensing of political parties and trade unions.

In accordance with the ideological and realistic purposes, Jordan never had nationalist businesses, usurped any private resources without offset or, subsequently, effected communism. Despite the fact that the monetary framework was liberalised and the
business sector arranged (market based), the Jordanian government kept assuming a large monetary role, in organisation and as an agent. Accordingly, the general meanings of the public private organisation and government-national relationship must be reformulated (Metz, 1989). The legislature had dynamically removed itself from the part of gathering business and the processes of production of merchandise and offering services, rather, the government had to activate its regulatory functions for all these activities. Accordingly, the private segment has begun to take part in full scale financial exercises, and these two patterns have empowered the nation to move quickly towards globalisation (ER, 2012).

During the 1990s, consecutive projects of financial change and political reforms were executed under the direction of the International Monetary Fund and the World Bank for the duration of 1992-1994, 1994-1996 and 1996-1998, individually. These projects were important for the restoration of the administrative regulatory program and the change of the general authoritative structure. In this manner, Jordan succeeded in supporting a proficient macroeconomic management strategy, which included the progressive diminishment of high financial irregular characteristics and the execution of an auxiliary change plan. During the 1990s, and in accordance with the exerted efforts for strengthening political reforms the Jordanian government hastened the process of economic change and the move to a more democratic government by embracing another change program issued by the International Monetary Fund covering the period of 1999-2001. During the reign of King Abdullah the second specifically, liberal financial strategies were applied.

Economic Reforms (2012) reported that the "Jordan First" activity was dispatched to develop a model of a liberal and vote based country as per the headings of King Abdullah the second, and was fundamental for the inevitable political and financial changes. The Jordan First activity was an endeavour for social cooperation between Jordanian community members, as it presented the concerns of Jordanians most importantly different considerations and personal stakes and reclassified the state-singular relationship. By contrast, the former change framework centred around financial activities, while, the Jordan First activity was a policy meant to open new ways and approaches for the change frameworks being developed, training, monetary matters,
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society, and the techniques of data and telecommunications. As a result of the mix with free monetary changes, Jordan showed an effective privatisation plan and an amalgamation into the new global economy, as clearly demonstrated by Jordan becoming an active member of the World Trade Organisation (WTO) in 2000; Jordan additionally gained a Free Trade Partnership Conventions with the USA and another Free Trade Conventions with the European Union in 2001. Moreover, Jordan is an active member of the Greater Arab Free Trade Conventions (AGADIR). These Conventions have been viewed as the main factors of financial development and advancements including management accounting frameworks. Besides, Jordan accomplished a big jump in expanding charges and diminishing imports, particularly when selling commodities outside to the USA with a full exemption from tax and customs tariffs through (QIZ) Qualifying Industrial Zone.

The government, in collaboration with the International Monetary Fund, presented another suggestion regarding the economic change and political reform framework as another activity for the period of 2002-2004. This framework proposed accomplishing social and monetary improvement, and enhancing the quality and way of life for the Jordanian people. This project intended to enable Jordanians to have a fair chance to partake in democratisation and globalisation activities. All the while, the project was intended to strengthen the versatility of the Jordanian economy to outside challenges by speeding up the pace of change. In the meantime, the changes procedure centred around human resource improvement, by encouraging brilliance, imagination, advancement, intensity, profitability, worldwide benchmarks and an entrepreneurial spirit. The administration perceives that the improvement of human resources is the foundation of supportable advancement, and is a significant source of enhancing the welfare of Jordanians. Consequently, Jordan could adjust to global reforms based on its resources to an information economy-base by upgrading learning capacities, explanatory abilities and IT proficiency at each phase of the training procedure. In this manner, the educational change depended on the reclassifying of education as the capacity to communicate in English and utilise the Internet efficiently, which will eventually empower the Jordanian
people to take an interest and participate in the democratisation and globalisation activities (ER, 2012).

Broadbent and Guthrie (2008) illustrated that open administrations have been seen by the legislature as a huge component with regards to more extensive monetary and social advancement, with an assumption that these open administrations will be accessible for all individuals of a society in a fair way. In relation to this point the World Bank (2007) can be cited here: "A well-working public management that provides high quality of public services reliable with people inclinations and fosters private market driven growth while overseeing financial aspects judiciously is viewed as basic to the World Bank's main goal of "pauperism mitigation" and the successful accomplishment of the "millennium advancement objectives". In such manner, accounting management is viewed as a critical innovation; despite the fact that what it can do and what it is seen to do is not as a matter of course the same issue (ibid.).

In 2004 the administration subsequently presented another change plan the future of Jordan. The legislature embraced a deliberate open authoritative change procedure to outline an arrangement of administration that would guarantee proficient distribution of open assets and accomplish monetary equity. The change procedure concentrated, to a great extent, on decentralizing leadership grip by enhancing open administrations through planning and training, notwithstanding presenting responsibility systems, and authorising budget breaking points and sound financial activities. Above all, the government got to be included in the more extensive national aims of poverty reduction and improving the conditions of residents.

Subsequent to 1989, Jordan has effectively executed different financial change projects to overcome significant uneven characteristics and to recoup macroeconomic dependability as a precondition for practical monetary development. A large portion of the goals in these projects have been accomplished and, now and again, surpassed. Table (2) shows the positive effect of International Monetary Fund change frameworks over the period of 1989-2004 and the detailed durations according to the economic reforms and political changes (1989-1992, 1992-1994, 1994-1996, 1996-1998, 1999-2001 and 2002-2004), by
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using the performance metrics for the Jordanian macroeconomic represented by the governmental performance for the public sector.

Table 2: Comparing Jordanian Macroeconomic indicators between 1989 and 2004

<table>
<thead>
<tr>
<th>Macroeconomic Indicators</th>
<th>1989</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real GDP Growth</td>
<td>-13.4</td>
<td>7.2</td>
</tr>
<tr>
<td>Inflation as a percentage change of CPI</td>
<td>25.7</td>
<td>3.5</td>
</tr>
<tr>
<td>Budget Deficit (including grants) as a percentage of GDP</td>
<td>-10.1</td>
<td>-2.7</td>
</tr>
<tr>
<td>Budget Deficit (excluding grants) as a percentage % of GDP</td>
<td>-21.7</td>
<td>-12.8</td>
</tr>
<tr>
<td>Foreign Reserves, million US$</td>
<td>130</td>
<td>4824</td>
</tr>
<tr>
<td>External Debt as a percentage % of GDP</td>
<td>190</td>
<td>66</td>
</tr>
</tbody>
</table>


It should be noted here that all the former change frameworks have concentrated on a specific part of the financial and political setting; there is a need to build up a more complete change framework to incorporate all parts of monetary and political connection. Having understood this, the legislature has reacted by building an extensive "National Agenda" for community issues, financial and political change to assess and regulate the advancement of its usage as per the key arrangements.

3.3 Analysis of the Jordanian Telecommunications Industry Architecture

3.3.1 Policy Framework

The Jordanian Telecommunications Industry follows the Ministry of Information and Communications Technology (MoICT) regulations.

- MoICT was recognised in April 2002 it is the government entity in charge of formulating strategy that has a direct relationship with Information Technology, Telecommunications, and Post in the Hashemite Kingdom of Jordan. The divisions inside Information Technology (IT) and Telecommunications are distinguished as specific drivers and empowering agents of social and economic development.
MoICT has general obligations regarding the accomplishment of National objectives and goals inside the ICT and has different means and connections available to it through which to accomplish them. MoICT in like manner has wide powers of oversight and activity inside the divisions that involve ICT.

MoICT encourages ICT activities that advance the reception of ICT by all fragments of society and empower local and foreign ventures. The dedication of the government to ICT as an impetus for advancement, especially through E-learning and E-government, is making business opportunities (Official site: http://www.moict.gov.jo).

The Ministry of Information Communication and Technology (MoICT) sees ICT as a vital asset in the advancement of an Information Society demanding socio-financial changes and monetary success through the divides. Its purposes include achieving Sustainable Economic Development and Prosperity by:

- Building up a venture atmosphere helpful for exchange driven private segment development, systems administration and efficiency (Dewenter and Haucap, 2011).

- Continuing the advancement of a regulatory domain in view of the standards of unhindered commerce and rivalry not just to the degree of making an energetic local industry, but to guarantee that Jordan is given an advantageous edge in international and local markets.

- Enhance exports as a major element to draw in Foreign Direct Investments and opening business doors for Jordanian residents.

- Enhance the commitment of the ICT division and postal services to GDP.

- Bridging the digital divides by enhancing base, instruction and mindfulness on the empowering parts of ICT.

- Creating private-public sector organisations with the private sector given a leading part in the improvement procedure.

- Attaining Social Development.
Add to educational improvements and advancement by upgrading the dynamic cooperation of women and the young over all aspects of life.

Grow the abilities and limits of the ICT area through preparing, mindfulness raising and ability-building measures.

(Statement of Government Policy 2012, the Hashemite Kingdom of Jordan – Amman- (TRC, 2012))

3.3.2 The Regulatory and Legal Framework

The Jordanian Telecommunications Industry also follows the Telecommunications Regulatory Commission (TRC) in terms of compliance with its own laws and legislation to control the services that are provided by these companies. The TRC was developed by Telecommunications Law No. 13 of 1995, and it was revised by law No. 8 of 2002 to be an autonomous jurisdictional authority which was assigned with directing telecommunications and areas of the information technology sector (Lutilsky and Ivic, 2013).

To fulfil the provisions of the Postal Services Law No. 34, 2007, TRC additionally started to assume liability for controlling the postal segment in Jordan and to monitor all postal service suppliers and to ascertain if they complied with the law (ibid.).

As per provisions in the Telecommunications Law, the TRC is tasked with the obligations of identify, managing and regulating information technology and telecommunication services that are in Jordan and are consistent with the polices that are expressed to ensure the best possible procurement of exclusive ICT services taking into account the end goal to furnish the end customers with sensible prices, and that such a way of pricing is used to ensure optimum performance in the ICT division.

As accommodated in the Telecommunications Law, the TRC conducts its obligations freely of the Ministry of Telecommunications and Information Technology yet is required to act in compliance with the general strategies of the government (Gabel and Rosenbaum, 2000).
As per Telecommunications Law No. 13 of 1995 and its corrections, TRC responsibilities and obligations are:

- To control telecommunications and the information technology services in Jordan according to the set up general strategy to guarantee that the provision of excellent methods for telecommunications and information technology services to the beneficiaries at sensible prices; and, by so doing, to make it conceivable to provide the ideal performance for both sectors; telecommunications and IT (ibid.).

- To build up the premise for the control of the telecommunications and IT sectors, as per the general policies which are established, in a manner that services address the issues that emerge from the comprehensive development in Jordan and as per the guidelines to be issued by the Board for this reason (Joel and Jae, 2000).

- To indicate the base level of services quality which should be carried out by licensed companies to address the issues of beneficiaries, in discussion with the licensed companies and without the inconvenience of a specific particular technological answers for them (Littlechild, 2006).

- To secure the interests of the beneficiaries and monitor the activities of the people and the licensed parties to guarantee that the positions of the licensed company are monitored by them, including determined service gauges, and providing high quality of services, and sensible prices; and to take vital action in such manner and to penalise those who have violated these conditions (ibid.).

- To empower competition in both sectors; telecommunications and IT sector, by observing the market powers, and by monitoring them with a specific end goal to guarantee the viable provision of telecommunications and IT services are made and to guarantee that the regulation is sufficient and that it is effective to forbid or curtail any illegal competitive practices or to prevent any person who has a dominant position in the market from abusing that position, and to take necessary measures in this regard (Laffont and Tirole, 2000).

- To take an interest in the representation of Jordan in negotiations, conferences, symposiums and meetings, and other international forums which are pertaining to telecommunications and information technology.
• To energise and ensure self-control by the telecommunications and IT sectors.

• To establish and embrace the conditions and criteria which are required for the allowing of licenses for telecommunications systems and services and for the using of Radio frequencies.

• To control the Radio Frequency Spectrum and to enable the regulation of the use of all terrestrial, maritime, aeronautical and space frequencies, including:

• Setting and keeping up the National Table of Frequency Allocations (Laffont and Tirole, 2000).

• Making the National Plan for Frequency Allocations and the National Register of Frequency Assignments, while being as a team with all the concerned parties in military and security elements (Kang, 2009).

• Maintaining the regular citizen share of the National Plan for Frequency Allocations by using the National Register of Frequency Assignments, and by distributing them to general society (Sekaran, 2005).

• To control access to telecommunications organises (networks) and to regulate the status of interconnection therewith as per the guidelines that are to be released by the Commission for this reason, confirm the interconnection conventions referred to in Paragraph (e) of Article 29 of the Telecommunications Law, and for ensuring that these agreements do not violate those instructions, by taking into account the status of any license conceded by the Commission or by any convention with the Government which is gone into preceding the successful date of this Law.

• To set up specialised guidelines and gauges which are for the connection of wire line or cellular, incorporating Telecommunication Terminal Equipment with the Public Telecommunication Networks, and required to set the direction methodology for importing such tools into Jordan, taking into consideration the bases which are prescribed in the prevailing Standards and Metrology Law (Gregory et al. 1994).

• To grant Type Approvals and to control the importation and uses of the Telecommunication Terminal Equipment that are required for individual and
private usages, or for the utilisation in particular regions, and for monitoring such usage (Sekaran, 2005).

- To collect all data relating to the telecommunications and information technology segments to get ready and release reports, leaflets, and issue guidelines for beneficiaries, and additionally to set up the media programs which are required for increasing public awareness on the importance of these sectors and on the extent to which these developments may positively impact the economic and social development in Jordan (Johansson et al. 2008).

- To issue a yearly report which describes the Commission's annual exercises and accomplishments, technology developments, any other variables which are the established general strategy identifying with telecom administrations, and the tentative arrangements that are made by the Commission, and to publish this report (Sidak and Spulber, 1997).

- To re-estimate what the needs for the alteration are on the level of direction of any Telecommunication Services, or a particular sort or group thereof, by taking into consideration competition factors and any other reasons, and to escalate the same to the Board to be approved (TRC-Jordan-Amman 1995).

- To propose any draft of laws which deal with the telecommunications and IT segment, and to escalate them to the Ministry, and to set up the by-laws which are required and to establish the instructions which relate to such by-laws and amendments thereto.

- To undertake any other tasks which are entrusted to the TRC pursuant to the legislations in force (ibid.).

3.4 Analysis the developments of the Telecommunications Industry

Telecommunication is the correspondence at a distance using mechanical means, especially through electrical signs or electromagnetic waves. Because of the wide range of developments included, the word is regularly utilised as a part of a plural structure, as telecommunications. Early telecom innovations included visual signs, for example, guides, signals, semaphore broadcasts, signal banners, and optical heliographs. Electrical
and electromagnetic telecom innovations incorporate broadcast, phone, teleprompter, systems, radio, microwave transmission, fibre optics, interchanges satellites and the Internet (Mandy, 2002).

The advancements in wireless Telecommunications started in the 1900s with spearheading advancements in radio communication by Guglielmo Marconi. In 1909, Marconi won the Nobel Prize in Physics for his endeavours. Other innovators and designers in the industry include Charles Wheatstone and Samuel Morse, Alexander Graham Bell (phone), Edwin Armstrong, and Lee de Forest (radio), and also John Logie Baird and Philo Farnsworth (TV) (Haynes, 2015).

The ability to exchange data through two-way telecoms systems developed from 281 pet bytes of (optimally pressed) data in 1986 to 471 pet bytes in 1993, to 2.2 (optimally pressed) exa bytes in 2000, and to 65 (ideally compacted) exa bytes in 2007. This is equivalent to two daily-paper pages for each individual every day in 1986, and six whole daily papers for every individual every day by 2007. Given this development, telecommunications assume an undeniably vital part in the global economy, and the worldwide telecommunication industry was valued at around $4.7 trillion in 2012. The service income of the worldwide telecommunications industry was assessed at around $1.5 trillion in 2010, relating to 2.4% of the world's GDP (Kaplan and Atkinson, 2015).

3.4.1 The Jordanian Telecommunications Industry

The fixed Telecommunications sub-sector was liberalised in January 2005 and opened to industry competitors. A new GSM Mobile license was granted to the Jordanian company "UMNIAH" in August 2004, making four mobile operators in Jordan including; Fast Link (GSM), MobileCom (GSM), Xpress (iDen) and Umniah (GSM).

The government approved the General Policy required for Universal Service in the Telecommunication Sector in 2004. In line with such approval, the Universal Service Policy has now set out the Universal Service Regulatory Framework, which includes giving instructions on sharing of USO cost, and has published this on its website on (2006).
The new Integrated Licensing and Regulatory regime represent the adoption of principles of unified licensing as have been supported by a body that is involved in regulation. Two forms of licenses have been brought into operation:

- **Individual License**: Obtaining an individual license which is required by public telecom network operators or by operators who provide public telecom services by using scarce resources, which are referred to as radio frequency spectrum, the public rights of way and numbers. The fee that is incurred for each individual license is 100,000 Jordanian Dinars ($140,000).

- **Class License**: Obtaining a class license is required by all public telecom service providers so that they do not overuse scarce resources and to prevent those providers who use those resources of having any tangible effect on the them. The fee incurred for this form of license is 30,000 Jordanian Dinars ($43,000) (Haynes, 2015).

### 3.4.2 Networks and Services Markets

The Jordanian government announced that it would be clearing off the entire remaining stake of the Jordan Telecom (incumbent) on 27/6/2006. The sale was not a successful one and resulted in the government still owning 11.7% of Jordan Telecom (incumbent). However, on 9/8/2004, the license of the telecom company UMINAH was given as a new mobile services provider through using the GSM mobile network. On 6/4/2003, the license of a Jordanian company (New Generation Telecommunication Company-Xpress) was given in order to provide Trunk Radio Dispatch services that included the use of iDEN technology.

The new Integrated Licensing and Regulatory Regime has resulted in the elimination of restrictions on the quantity of licenses which will be presented (Laffont and Tirole, 2000).

Twelve ISPs are currently in operation in Jordan, which include: Al-Deka, Wanadoo, Viacloud, MEC, NEXT, LINK, Cyberia, TE-Data, Sama, Batelco, Arab International Company for Education and Investment, and Swftel.
The TRC has carried out a transition of 23 existing class licensees to the new licensing regime, which has permitted the expansion of the scope of services to be capable of competing with the incumbent Jordan Telecom.

TRC has transitioned three Mobile Service licensees; Fast Link, UMNIAH, and XPress to be subjected to the Integrated Licensing Regime (Individual License). The process of carrying out the transition of Jordan Telecom and MobileCom to the Integrated Regime is currently in progress. On 29/8/2006, TRC published a RFC seeking remarks and thoughts which would prompt the acknowledgment of the Next Generation National Broadband Networks, which are situated in Jordan. The TRC is presently during the time spent assessing all the remarks that have been gotten from related parties.

The total number of licensees for Public Telecommunication Services in Jordan is 60. Two Radio Spectrum Licenses for (FBWA) Fixed Broadband Wireless Access administrations were granted in Jordan through a competitive offering process which was completed and brought about recompensing it to two Public Telecommunication Services licensees; Umniah (3.5 GHz) in December 2006, and ATCO-Clear wire (3.6 GHz) in January 2007 (Dewenter and Kruse, 2011).

3.4.3 Impact of the Telecommunications Sector on the Jordanian Economy

There are three large companies providing cellular communication services with fixed telecommunication services and the Internet. Those companies are Orange, Zain, and Umniah. These companies have the dominant position in the market with a large market share of the Jordanian Telecommunication sector. Other companies, such as Internet and WiMax companies barely earn enough because of the liberalisation of the market and high competition among rivals.

In 2011, the total revenue of the three companies was JD 936 million, which is an increase of 1% over the year 2010. The total net profit for the three companies is 208 million dinars, a decrease of 5% from 2010, which amounted to 218 million dinars (MCTRC Jordan 2013).
In 2011, the highest net profit was 26%, 22% and 15% for the third. The overall rate of net profit margin for the three companies was 20% in the first quarter of 2012 and 22% in 2011 and 23 percent in 2010 (MCTRC Jordan 2013).

The three companies "brought" sales taxes up to 233 million JD from telecommunications services in 2011. This was paid by citizens and non-citizen residents of Jordan. The total paid users of telecommunications services in Jordan for 2011 was about 1.169 billion dinars (Sales tax about 29.9 on the cellular services and 8% online and 16% on other services) (MCTRC Jordan 2013; Haynes, 2015).

In 2011, the three companies also paid participation fees returns up to 61 million dinars, and income tax up to 64 million dinars. When calculating participation fees with income tax returns (to reflect the actual tax) it shows that the effective tax rate on the three companies was 37 percent in 2011 (MCTRC Jordan 2013; Lutilsky and Ivic, 2013).

Each of the three companies paid 50 million dinars of the license fee for third generation services (3G) totalling to 150 million dinars (Orange in 2009, Zain in 2010 and 2011 by Umniah). Each has invested about 50 million dinars (a total of 150 million dinars) in the establishment of the new third-generation networks. It is an investment of about 300 million dinars (half of which is the government's fee) which represents two-thirds of the total net profit of the three companies in 2010 and 2011 and the first quarter of 2012. This third-generation license is for a period of 15 years for each company (MCTRC Jordan 2013; Kaplan and Atkinson 2015).

The licenses of the three companies basic cell are not permanent, but 15-year. Orange will renew this in 2014/2015 and Umniah in 2019. Zain extended their license in 2006 for fifteen years to come against the payment of 80 million dinars in cash. At the time of renewal, the government is entitled to know their future expectations and the agreement regarding the renewal of the licenses (MCTRC Jordan 2013). If the company does not agree, they have to either sell its network or demerger and leave (Dewenter and Haucap, 2005).
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The success story of the Telecommunications sector is the replacement of the monopoly of government institution by the competitive market where foreign direct investment and private sector operators (bearing all the risks of the investment without any government guarantee). The competition has benefited users because it reduces the prices of services and a multiplicity of options has spread widely (Fontana and Frey, 1994). The Treasury has benefited from tax collections exceeding 400 million dinars in 2011 alone. The owners of the companies have made a profit. Of course, there are legitimate reservations on Umniah and its license terms (MCTRC Jordan 2013; Lutilsky and Ivic, 2013).

The mobile telecommunications sector generated the highest sales tax in Jordan and the region, and the effective tax on cellular companies is the highest tax on any sector in Jordan. Increased electricity prices in the sector by 150% will reduce the net profits of the three companies by 12%. The income tax increases will decrease the proportion of net profit for the three companies to less than 15% in 2012. Pressure on corporate profits (which is currently the proportion of the profits of all logical standards) will adversely affect the ability of companies to invest in new technologies, as well as reduce value of substantive renewal of licenses renewal time (MCTRC Jordan 2013), No one invests to lose! (Lutilsky and Ivic, 2013).

Customisation with liberalisation and competition often hinder gain. The government takes the telecom sector as a model for the success of other sectors. The government has replaced private monopoly companies in sectors such as mining, electricity and the refining sector (MCTRC Jordan 2013).

3.5 Conclusion

This chapter provided background information on the JTI and analyses network pricing used in the therein. This chapter also reviewed the development of the JTI and presents the structure of the Jordanian telecommunications markets, in terms of the three telecommunications services providers Orange, Umniah and Zain. Additionally, the role of the Jordanian telecommunications regulator - TRC is outlined. Finally, towards the end of this chapter, the impact of the telecommunications sector on the Jordanian Economy is summarised.
CHAPTER FOUR
COST-ORIENTED PRICES AND REGULATION COSTING MODELS

Overview

The theoretical framework of this research is discussed further in this chapter. It introduces background information on the traditional cost accounting systems through the following sub headings: definition, function, importance and objectives, elements, concepts and criticisms. It also presents and further discusses the establishment of the cost accounting system based on the LRIC model by using the activities-based cost (ABC) methodology to allocate indirect cost. Essential liberalised utilities issues and why telecommunications industry needs to be regulated are introduced. Finally, some general costing and pricing methodologies in the telecommunications industry are addressed, taking into account interconnection-related issues in details.

4.1 Introduction to Cost Accounting System

Traditionally, accelerated development characterises economic sectors in the modern world, whether the service or industrial sector. A large number of industries with a variety of products have been established that use technical and technological advancements in different manufacturing processes, they are necessarily accompanied by an independent cost accounting system. Cost accounting systems (CAS) are vital as they provide detailed data and instant information for the management of industrial projects, CAS assist in the planning process in terms of both efficiency and effectiveness.

Executive boards put great hopes on the cost accounting system, in terms of tightening the process of measuring costs and controlling and reduce extravagance and waste. As a result, CAS prepare projects for the competitive market, firms set competitive prices based on the cost, achieve a reasonable profit and continue and develop in the long run.
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Significant developments in the manufacturing processes and policies have had a major impact on cost accounting systems. CAS can assist management in focusing their products, analysing which are the most efficient and thereby increase profits. They can also assist management in making better decisions in the design process, marketing products, sales blending and encouraging continuing operational developments. Moreover, CAS can impact a decision to discontinue certain products, possibly increasing competitiveness and market share.

The direct costs are easy to collect and then trace for the relevant unit cost element. This is because there is a causal relationship between cost and unit cost. By contrast, the indirect costs are difficult to allocate to a specific unit cost element. This is because there is no direct causal relationship between them, and thus the cost pool is used to collect these costs and then allocate them by using a proper cost driver. The figure (12) shows the cost assignment process:

**Figure 12: The Cost Assignment Process**

![Diagram of Cost Assignment Process]

* Source: Author’s own figure.

4.1.6 Traditional Methods for Allocating Costs

One of the objectives of this research is to study the use of the cost accounting system based on the LRIC model and highlight its advantages compared to the traditional cost accounting systems. Therefore, it is necessary to display the traditional method, explaining its advantages and disadvantages. The traditional cost accounting system often
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depends on one cost pool for allocating indirect costs. The steps of the allocation process are as follows (Horngren et al. 2006):

- Determine the products that will be selected as the cost objective.
- Determine the direct cost of those products.
- Choose a proper cost centre to use for allocating the indirect costs of those products.
- Determining the indirect costs that are associated with each cost centre.
- Determine a proper cost driver to every cost centre to allocate the indirect costs. Such as the hours, number of subscribers, traffic volumes and minutes.
- Calculate the allocated indirect cost to the related products.
- Calculate the total costs, including the allocated indirect cost and the traced direct cost for all products.

Figure 13: Cost Assignment and Allocation Flowchart

* Source: Author’s own figure.
4.1.7 The Criticisms of the Traditional Cost Accounting Systems

There are many advantages of using traditional cost accounting methods such as: the lower cost of its application, it is easy to deal with it as it does not require computer programs, it is also suitable for firms that produce a single product or provide a single service or in the case of a firm its indirect costs are not significant to a certain extent (Johnson and Kaplan, 1987).

However, the traditional method for calculating the total cost of products and preparing the estimated budgets is unable to develop performance. In responding to the requirements of the new stage, where the resulting figures from this method became inaccurate and non-objective, it does not help in providing accurate information to the firm’s management, in terms of planning, control, follow-up and continuous development (ibid.).

Direct labour was constituted as a significant proportion of the production cost. In contrast, today direct labour has been replaced with technical development, and thus the volume of direct labour has decreased in comparison with the volume of the activities that support production. Consequently, indirect costs increased dramatically (Horngren et al. 1999). Furthermore, the traditional cost accounting method ignored the complexity of activities and did not measure its cost, which led to a distortion in calculating the final product cost, especially in firms that produce multiple products (Johnson and Kaplan, 1987).

This method also allocates a larger proportion of indirect cost on big products compared with a smaller load of the indirect costs on the small products. This is in the case of multi-product firms that produce a variety of non-homogeneous products. However, this allocation is not commensurate with real practice (Cooper, 1987).

Consequently, the disadvantages of the traditional cost accounting method can be summarised as below:

- It assumes that the production units of a particular product have doubled, and thus indirect costs will also be doubled. Thereby, allocating a larger share of
indirect costs on big productions and a small load on small productions, this is not correct practice.

- Traditional cost accounting method focus on financial results not the actual activities that are the reason for these results ultimately.
- The traditional cost accounting method does not help the management in planning, control processes or administrative decisions.
- The traditional cost accounting method does not work in the case of a multi-product firms that produce a variety of non-homogeneous products.

4.2 The Establishment of Cost Accounting System Based on the LRIC Model

There was a need to provide a better measure of indirect costs for resources used in various cost objectives. This led to the emergence of the LRIC model using the activities-based costing (ABC) methodology to allocate indirect cost, aiming to help business administration in making strategic decisions. The repercussions of the application of a cost accounting system based on the LRIC model using the activities-based cost (ABC) methodology to allocate the indirect cost are listed below (Horngren et al. 2006):

- The diversity of products and services as a result of technological development and increasing competition in the provision of services and variety of products.
- The increase in indirect costs as a result of using technology instead of labour.
- Technological advance.
- The increase in competition intensity and the desire of increase market share.

4.3 The Purpose of Telecommunications Prices Regulation

There is no study or research in relation to pricing and cost regulation system that emerged without a brief background reference to the evolution of the telecommunications industry.

The telecommunications industry was characterised as a monopolistic industry. The fixed telephone was deemed to be a natural monopoly. A production which included input related cost, these costs were increased at an invariably lower level than the increases that
were made in the incomes, thereby causing an optimum theoretical level in the quantities and prices of telephone services that were provided. This gave rise to the need for the government to intervene in the process of setting tariffs, while at the same time addressing other objectives that related to social plans and policies (Johansson et al. 2008).

When there is a monopoly, the regulatory body is able to perform various functions in relation to the service, which include for instance, the regulation of investment plans and the quality of service provided. The creation of autonomous entities which are capable of regulating the service providers in terms of determining the fees started only in the 1980s. To a great extent, this delay in regulation can be ascribed to the fact the monopolies were, generally, all state-owned entities (Klein, 2007).

On the basis of these facts, the government or the regulator, established their own pricing decisions which were based on a variety of considerations, including a greater transfer of incomes from international telephone service companies to local services. This had a significant impact on the budget of various customers, in many instances the tariffs were not in accordance with costs incurred, whether they related to each type of service or for the entire business as a single entity.

In response to the aforementioned situation, bearing in mind the obvious link that exists between economic and social advance and the telecommunications industry, most countries began to consider more consciously the tariff setting process. This generally established a little relationship with the incurred costs, and to the consideration as to whether allowing more participation of the private sector in providing services was required (Kaplan and Atkinson 2015).

Later, in the 1980s the initial step was made to open up other telecommunications industries in order to create competition in the United States of America, this was followed by European countries, which liberalised the use of international services (long distance). This initiated a hypothesis shift which caused it to be necessary to bring prices in line with incurred costs. The evolution of such new services gave rise to the need for monopolies to regulate their prices to be in line with incurred costs. Meanwhile, the
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requirement of ensuring the well-being and improvement of the services gave rise to the need for new ideas of regulation (Heng et al. 2009).

With the meeting of Universal Service Obligation (USO) it was implicitly or explicitly entrusted to the incumbent company, either because its cost coverage and scope or general commitments that are made in respect of providing telephone service (as well as other feasible variables), or due to the USO constituting a particular item in the general commitments of the service provider the opening up of the telecommunication sector to embrace all forms of competition. The regulator was required to clearly identify the scope and commitments and the amount of costs which were involved in any universal service deficit (Gitman and Madura, 2001). The Figure (14) demonstrates the universal service as originated with Rowland Hill:

**Figure 14: Universal Service**

![Diagram of Universal Service](image)


The idea of all universal service seems to have started with Rowland Hill and the Uniform Penny Post, which was presented in the UK in 1837. In spite of the fact that Hill never utilised the expression "universal service", his postal framework had the signs of an early universal service; postal charges were diminished to a uniform rate all through the country, a rate which was moderate to most British people. Empowered by the postage stamp that was used by a monopolist General Post Office on mail. Changes made by Hill were immediately embraced by postal commissions around the world, including the
United States Post Office Department (now the United States Postal Service) which effectively held an imposing business model through the Private Express Statutes. The service commitments of USPS under law are regularly alluded to as the “universal service obligation” or "USO". Universal service is additionally a key target of the Universal Postal Union (London Economics, (September, 1994)).

The notion of "Universal service", seems to have begun again in 1907 with Theodore Newton Vail, president of American Telephone and Telegraph (the first AT&T) and leader of the Bell System, with the company's logo "One Policy, One System, Universal Service". It was expected as a complexity to the "dual service" that had been normally used in the first Bell phone licenses lapsed in 1894, where autonomous phone firms worked in non-Bell System markets as well as a rival in Bell markets (Dewenter and Kruse, 2011).

These autonomous telephone firms did not interconnect to the Bell System; however current commentators believe that Bell declined to do as such as a reason for monopoly situation, it was contended then that telephone networks on that day couldn't connect except if all telephone firms utilised the same system, as it was in the Bell System (Thierer, 1994). This required numerous firms to keep telephones with both networks, or taking the risk of losing their clients who would be joined to the different telephone network (ibid).

The regulation and the interconnection between companies which is carried out, with new services is being connected to the network, from various networks, to those which are already in being (mobile telephony), also the possibility of providing a similar, competing service by new networks operators.

Hence, the increasing need for regulating the prices of the telecommunications services came into existence. This need was across the whole range of telecommunications, including tariff setting for essential services in the monopolistic industry and to the introduction of new needs which stemmed from competition, wherein price regulations were maintained for as long as there was a situation of market dominance. Additionally, the computation of any deficit that arose regarding the universal service obligations of
services providers and for the identification of interconnection prices. In the event, that such a regulatory administration includes an unbundling commitment made with respect to the incumbent operator's basic facilities being given regard to, there is also the requirement of regulating the value of hiring such facilities (TBD, 2007).

4.3.1 World Trade Organisation (WTO) and Liberalisation

In accordance with the terms stipulated in the General Agreement on Trade (GAT) in services that was published by the World Trade Organisation (WTO), to which many of the countries of the region to which Jordan belongs has subscribed, the presence of a telecommunications regulator is necessary for ensuring competition, and managing scarce resources. The latter function will be carried out and will be applicable even in the event that there is no competition in the provision of services (Kang, 2009).

There exists at least three scarce resources in the telecommunications sector. These include the radiofrequency spectrum, the sphere relating to rights of way and that of numbering. The administration grants numbering facilities which are free of charge, and which are made whilst maintaining the management rights and, in most cases, their ownership of the various resources that are in question, whereas the use of the spectrum of available resources and the rights of way are usually granted by the operators on a paying basis, although in some cases there have been instances of them being granted to the users free of any charges.

In modern liberalised markets, the regulator's new commitment has been to make sure that the market in which it operates works towards profit. This requires deciding as to which end the interconnection aspects which are issued and, as to which forms of interconnection there are positive obligations on. This may become subject to regulation which is carried out prior, or which is made in a matter of contract that arises among the parties (much customary agreement). However, under these circumstances, there also exists obligations of non discrimination and that of ensuring the availability of the possibility to appeal to, and-or to resort to arbitration by the regulator (Laffont and Tirole, 2000).
As discussed above, one of the key regulatory ideas, which is evident in such cases is that of price setting or, at least, that of ensuring the orientation of the interconnection prices. Where there exists a commitment upon the various dominant operators or - as occurs in most cases - services provider(s) who have the market power, or any other players in the market that may be specified, in order to unbundle the basic facilities so as to enable them to be available for utilisation by any other service provider, as there may also be a requirement of setting or providing for prices.

4.3.2 Essential Facilities

Essential facilities refer to those network elements which can be unbundled. They are also those which, for technical and/or economic reasons, that cannot be replicated by any other service provider in order to ensure the provision of its services.

The International Telecommunication Union (ITU) and WTO and other telecommunication literature have accepted a few general principles and it says that prices must be cost oriented or in other words it must be aligned on cost. The name that has been given to the principle is cost causality principle (Calzada and Trillas, 2006).

4.4 Key Concepts in the Area of Telecommunications Costs

Going by the theory given by expert economists the optimum price refers to the price which equals the marginal cost that is incurred on a unit that is recently provided. However, it must be noted that in practice this does not hold true because of the existence of the natural monopoly which is characterised by failing marginal cost and because the price needs to be periodically revised for every additional unit and also with large discrepancies that would depend on whether the networks include the extra capacity and the marginal cost is zero.

Apart from this, we know that the fixed cost will not be recovered because of the marginal cost and prices that are determined would be below the average cost that has been incurred.
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In the light of this limitation, economics developed the notion of Long-Run Incremental Cost (LRIC), which takes into account the total cost that is incurred when engaging in proving a separated additional value (increment) of the given services and which can be applied in telecommunications and other public services to which diminishing costs are attributed. These developments are an implication of the acceptance of the cost causality principle, which is that the price should be a reflection of the cost that is incurred when producing the service and not that of other costs that are incurred (Joel and Jae, 2000).

The production process is a part of the telecommunications industry too and, as such, is related to the phenomenon of economies of scale and thus distinguishing between economies of scale and economies of scope is inevitable. Economies of scale arise from lower short run costs that appear in higher levels of production. The costs that are incurred in production of the goods and services combined is usually lower than what would have been the cost of production had the goods and services been produced individually (Littlechild, 2006).

4.4.1 Historical Cost

Historical cost (HC) can be defined as "the costs that are recorded in the accounts or record books of the incumbent service provider and there is no other additional cost hence the historical cost shows the actual cost that has been incurred". While using the historical cost approach the advocates that determine the price are the incumbent services providers themselves. There are several advantages of using this cost and the incumbent users prefer to use this method of costing as this method ensures that all past expenses are recovered and taken into consideration. There are costs that have been incurred on technologies that now have become redundant or obsolete and have been replaced by new technologies or the costs that were made keeping at pace with the demand of that time but now has no relevance to market conditions.

There are disadvantages attached to historical cost that have been pointed out by experts. It has been observed that with the use of a historical method of accounting cost the organisation loses its efficiency as the use of outdated technologies and obsolete methods of operation are being accepted by the producers.
4.4.2 Forward-Looking Cost

Forward Looking Cost (FLC) is one way to motivate management effectiveness and productivity equally to the costs that are used towards the motive of price setting and the higher costs are not considered that is derived from technology and ineffectiveness of management. The inefficiencies that were present in the operator’s historical activities that has been removed supposed to be expected in the present network nodes (scorch node approach). Technology forms that will be available are mostly the ones that have already been applied before by the organisations to test the efficiency and safety of it. It is commonly available in the market and is generally not that up-to-date. They are usually advised that for the ultimate and complete network design it should be assimilated any equal degree of starting impassive extent which is present and hence makes it all the more comparable with the state of the imperative operators (Heitzler, 2009).

LRIC method is connected with forward looking costs. A criticism is that vitally regularised against the forward looking cost method is that it is imperatively interrelated to the unborn difficulty that occurs from the structuring an engineering model which explains about the company that is considered to be most suitable that is supposed to be imaginary (Thanapalan et al. 2009).

4.4.3 Current Cost Accounting

Current Cost Accounting (CCA) method is a financial term that can be referred to as an approach that evaluates assets at their appropriate market price rather than historical value. Current costs can be implemented in several ways including the implication of specific price index to the book value of the asset. An operator whose management and regulation of given resources has not been efficiently managed is shown. Forward looking cost can create a situation in which it might seem quite difficult for a telecommunications operator to realise even when the method is continuously attempting into the competition along with the market changes at the same time (Heng et al. 2009).

The concept of current cost can be used in order to correct historical costs, it can be explained as a method that updates historical costs and includes the use of the latest
advanced technologies, it avoids inefficiencies on the side of an operator. Current costs can correct drifts or deviation that are likely to occur unlike historical costs and is shown in the accounting records (Cohen, McBride, Panzar and Waller, 2011).

4.4.4 Fully Distributed Cost

Fully distributed costs (FDC) are implemented in the historical costs of companies, it is used to assign costs directly to the services that are provided. For the distribution and circulation of direct costs and indirect costs associated with the product.

This method of costing is used as one of its key aims is to connect indirect costs so that one can validate the proportion and/or the allotment of costs among various types and forms of services that are distributed. However, transparency is not always achieved when costing.

The general perspective that is implied comprises of (1) Distribution of costs according to the respective share allotted to every service on the basis of the output (production share method), it is commensurate to the shared quantitative measurement of costs in physical terms. (2) Cost distribution according to the share that is to be allotted on the basis of each service in terms of revenue (gross revenue method), the proportion remains the same while distributing costs as it was undertaken that services contribute towards the generation of the gross revenue. (3) Cost distribution in accordance with the net revenue (net revenue method) that is earned which is similar to the recent method but is on the basis of the contribution made towards the net revenue. (4) Cost distribution in relation to the share of services that are imparted in line with directly locatable costs (allocated costs method) (Gitman and Joehnk, 2001).
4.4.5 Activity-Based Costing

The ABC (ABC) method of costing is a management accounting tool, which is used to establish objective causal relationships that are made between costs and services. The costs are viewed in light of the services that are in question and as a set of activities. The costs are deemed to consume resources, and this gives rise to the generation of costs. The ABC methodology is capable of using cost drivers which are used to issue the causal connection that exist among the activities and costs that give rise to costs, thereby strengthening the ultimate causal nexus that exists between costs and the provision of services to consumers which constitute final product or the provision process output. In applying the ABC method of costing, costs are assigned to the services which are directly where the nexus is unmistakable, and they are indirectly where the nexus that can be determined easily (as is the general case between common and joined costs). Shared or joint costs that are identified by this method are those which were incurred during the provision of more than one service which is carried out at the same time, while common costs are the costs which are incurred in line with the general management of the firm. These costs are easy to allocate to an identified or particular production of one or more services (Heng et al. 2009).

4.4.6 Long-Run Incremental Cost

In the case of a company which provides various goods or services, the incremental cost method is useful as it takes into account the changes which result from an increase in the supply of the given goods or services, which includes all of the direct and indirect costs which are attributable to that change or the increment of costs that is incurred. This means that the indivisibilities that are intrinsic in that should also be taken into consideration. The incremental cost also includes carrying out an assessment of the sensible rate of return which is incurred on the capital invested. The costs are computed in the long run, i.e. over a predetermined and separate stage of time.

From an economic view, any rise that is incurred is in and of itself an increment of the costs; hence, the incremental cost usually is an implication of a definition made with regard to the size of the increase in costs which are associated with the increase in the
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costs incurred in production. Mathematically speaking, the incremental cost can be defined as the difference that arises between the total costs that are associated with the overall production of the service, including the increment that arises with a subtraction of the total costs which are associated with the overall production which is carried out no increment (Kang, 2009).

The LRIC can, therefore, be defined in two ways that correspond to each other. In contrast, the cost referred to as the additional cost that is incurred by a firm over the long term when it is involved in giving a specific service in light of the assumption that the majority of the other generation exercises will stay unaltered. On the other hand, the cost is referred to as the total cost which the company is able to avoid in the long run in the event that it was to completely stop the provision of that specific services (avoided expense).

LRIC models have been used to establish efficient costs in the regulation of telecommunication prices. Recommendations have been made by the European Commission in relation to the LRIC model as the preferred costing methodology for EU member states. LRIC models have been embraced not only by European nations but also in states all over the world. Controllers, incumbents and new entrants are capable of understanding the cost base of the network of efficient service providers. This method of costing is indispensable in today's fully competitive markets, where prices are controlled by various forms of pressure, which are constantly made by national regulatory commissions, and are used especially for wholesale clients to provide reasonable prices for customers who are looking for the best deals on offer (Seminar 02-03 Feb 2014 at Radisson Royal Hotel Dubai).

Figure number (15) shows the various components of the LRIC Model as agreed upon and set out by the European Commission.
4.5 Cost Modelling

Cost modelling is the method of broadening the scope of the regulatory strategy so as to enable the determination of the most suitable forms of costs according to cost causality (referred to earlier) that applies to a given network. The goal herein is a systematic methodology, with a range of methods for the calculation of criteria and principles for identifying costs and for making up-to-date usage criterion and the technical amounts (coefficients) for the determination of the theoretical costs that are incurred by an efficient operator in a given market (Joel and Jae, 2000).

Costing methodologies help stockholders and accounting management find the cost which are incurred for specific activities and the procedures. Using financial calculations or cost accounting distribution can take basic information relating to the resources used by the organisation, for instance: raw materials and direct labour, and change such information into helpful costs which are used for determining prices of products and services. Firms can then adopt one of the various costing methodologies which meet their requirements whether financial or operational.

Most firms utilise these costing methodologies in their every day operations. This is related to the firm's revenue strategy which is to amplify their monetary worth for shareholders, also this can be used to reduce the cost which is essential to fulfilling this
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main aim. Another reason for using the costing methodologies is to make a repeatable procedure which permits stockholders and management accounting to apply such models in various circumstances. By this procedure, the firm is capable of developing a metric which then turns into the standard or the normal rate of return for the activities completed by the firm. This prevents the firm from missing out on cash when making a decision to start a new business that seems to be profitable but in fact it is not (Littlechild, 2006). Figure 16 shows the conceptual basis of cost model (Materials Systems Laboratory Massachusetts Institute of Technology Cambridge, Massachusetts Cost Lecture 1+).

4.5.1 Conceptual Basis of Cost Model

Figure 16: The Conceptual Basis of Cost Model

* Source: Massachusetts Institute of Technology, Cambridge, Massachusetts.

Costing methodologies can be utilised inside a scope of potential outcomes, from that of a ‘methodology guide’ kind of model, which strives to identify costs, to a ‘black box’ sort of model which requires the contribution of various essential information components, (traffic, interconnection network elements, etc.) in order to establish a theoretical optimum form of engineering cost.

Generally speaking, these cost models are considered to be the ‘scorched node’ type of models, used in acquiring certain restraints that the current network utilises and integrating the market realities in every country (such as, the asset prices, manpower
costs that are sustained, cost of capital, etc.) along with the formation of the physical network traffic data. Models have been arranged on the basis that they can formulate the network around ideal design criteria (Gabel and Rosenbaum, 2000).

4.5.2 LRIC Approaches

When it comes to cost modelling the bottom up and top down methodologies can be used. First the bottom-up approach of cost, in this an ideal or fictitious system used to make estimates, these estimates depended on various statistical data.

In top down approach the network that exists is considered to be the data source for the collection of determinants of current types of cost and are supposedly applied to the data value which in turn are used as a step in incorporating all the costs that are forward looking and incurred, the appropriate cost shares are related to the volumes of production (Holler, 2010).

The point of distinction that is mostly recognised in relation to TSLRIC is related to the accounting allocation criteria which are made in the ideal model for the purpose of allocating costs that are divided among various services pertaining to the cost of assets. Keeping in mind that whether the distributions made are from the asset value related to various services or it involves assets used in the process of production. By doing this one will be able to calculate the corresponding costs. This will determine how the corresponding cost is calculated (top-down approach). To determine the cost model, the regulator can set variables, from the levels of inefficiency providing a sensible rate of return on capital proportionate to common costs; and these common cost can be recovered in each type of operation through the forms of equal proportionate mark-up (EPMU) approach (BDT, 2007).
4.6 Key Concepts Related to the Study of Costs

4.6.1 Access Deficit

Access Deficit (AD) relates to the fixed costs that are attributed when it comes to deploying a network that has been covered by the customer and it is the incumbent users and the operators who pay for it. It can be defined as the revenue that is provided by all service providers who have joined the network and go on to pay for interconnections, this ultimately leads to the covering of the access deficit that has been incurred. It must be noted that this will depend upon the level of price that has been agreed by the regulator.

General economic agreement arises where tariffs are considered; prices appropriate to the incumbent service provider's customers must be covered by the access cost such that the price of usage for the interconnection is independent of the access shortage (Katz, 2009).

4.6.2 Unbundling

In order to engage in competition, the infrastructure for new entrants and the basic network facilities are sold by the authoritative operator, this is what the unbundling of vital facilities consists of. This responsibility is not essentially present in all forms of regulatory substructure yet mirrors the processes of telecommunications liberalisation (Gitman and Joehnk, 2001).

4.6.3 Interconnection

The International Telecommunication Union (ITU) refers to interconnection as the financial and technical configurations, according to which, the services providers are able to connect their equipment, their networks and their services to enable the end users to have the access they require to other end users, and other services and other networks that are provided by other service providers. Interconnection is defined as ‘referring to a set of physical and logical factors which are linked between the two forms of telecommunications networks’, (ITU, 2003) this has also been illustrated in Fig.1 and 2.
In case of developing a service agreement between two parties the WTO ensures interconnection of networks with the most dominant operator in the region for the convenience of customers. This interconnection between the network and the domain operators or network users generally could be of two types that is direct and indirect interconnection. In case of direct interconnection two networks are physically linked to each other and depend on a single or multiple point of interconnection (POI). Indirect interconnection users rely on another third party network for communicating with each other (Holler, 2010).

According to legal texts of WTO agreements, it is a universal regulation for determining interconnection charges considering the used network elements only. However, it should be mentioned that the above regulatory approaches do not have effective impact on one-way or two-way interconnection networks. In case of one-way interconnection where users of a network solely enjoy the facilities for accessing others users within the network and in case of two-way interconnection users of two networks could access each other’s. A call from a customer on one network to another on a different network, and then the interconnection point to the next customer can be deemed to be the mobile call termination (Gitman and Madura, 2001). The charge of mobile termination has been viewed as a wholesale rate for interconnection services (see Fig. 17).
From the figure 17, network A is normally in charge of its own beginning cost which is incurred up to the point of interconnection. From the purpose of interconnection to the customer from network B, what is generally alluded to as mobile termination, and the network that can be deemed in charge of the cost that is incurred relies upon the telecommunications charging system. For instance, the practice in the EU is that a calling party network pays (CPNP) system applies: the starting service provider is required to pay this expense to network B. In Singapore for example, the regime that applies is the bill and keep (BAK) method; the end service provider is in charge of this expense and their own network costs as well. According to the OECD (2012), these charging regimes are provided for wholesale interconnection and can be categorised into four models:

- Calling Party Network Pays (CPNP) – The starting network incurs responsibility regarding its origination expense and from there on pays the termination costs that are incurred to the terminating network. The instalments which are made to the terminating network are referred to as MTRs. The CPNP method is commonly utilised around the world including the EU. Figure (18) outlines that the calling party network pays (CPNP) model for charging the interconnection rates.
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Figure 18: Calling Party Network Pays (CPNP)

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Calling operator (A) pays originating rate
Terminating operator (B) receives interconnection rate
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* Source: Author’s own figure

- Receiving party network pays (RPNP) – The terminating network incurs responsibility for the costs in terminating and also has to pay the originating network for the originating cost. This model does not exist in any country.

Figure (19) illustrates the Receiving Party Network Pays (RPNP) model for paying interconnection rates.

Figure 19: Calling Party Network Pays
Bill and keep (BAK) or sender keeps all (SKA) – The originating system incurs responsibility regarding its origination expense. Likewise, the terminating network is required to be in charge of the terminating cost. Singapore and Hong Kong are applying this method while the USA consolidates the BAK and CPNP methods which are used for its charging system.

Peering and transit – This model is mostly applied to Internet interconnection and is usually referred to as a BAK model though it is slightly different in practice.

The OECD (2012) also claimed that the literature sometimes mixes the use of the wholesale charging regime with the retail charging regime. The OECD (2012) therefore, said that retail regimes could be divided into three categories as follow:

Calling party pays (CPP) – The caller is responsible for the cost of communication while the receiver does not pay any cost. CPP is used by most countries and is usually combined with the CPNP model. However, CPP can be mixed with other wholesale regimes. For example, Singapore applies BAK but uses CPP as a retail charging regime.

Receiving party pays (RPP) – The OECD (2012) mentioned that strictly defined, this model can be considered as the receiving party being responsible for the cost of communication while the caller does not have to pay. For example, the USA, in which both the caller and the receiver have to pay, should be considered as combining two regimes, a mix of CPP and RPP. The OECD (2012) accurately claimed that the USA’s retail regime would be better categorised as a bundled regime.

Bundled – There are several approaches to bundling voice service, such as bundling with SMS, MMS or even a mobile phone.

4.6.4 Empirical Evidence Relating to MTRs

There has been little discourse on the empirical evidence that relates to MTR (mobile telecommunication rates). Dewenter and Haucap (2005) connected the pooled estimation with an end goal to examine the impact of MTR on determining market share of service providers. The study inspected versatile end charges and their direction when network
size is unbalanced. It showed subscriber lack of awareness about the exact termination charges (a) for the small size of the telecoms network, termination charge will be higher compared with larger telecom networks (measured through number of customers) and (b) uneven control bigger service providers in a telecommunications market will impel the small service providers to expand their charges. The outcomes are bolstered by observational proof utilising information on portable termination charges from 48 European cellular services providers over the period 2001 to 2003.

Littlechild (2006) applied a basic linear regressions and concluded that applying the RPP method will decrease prices, yet later increased usage of cellular subscribers, notwithstanding, subsequent to this method the operator who applies this method will pay just the termination rates for receiving its subscribers calls. The worry will be that subscribers can change their cellular telephones if there is restricted cost control. As a result, subscribers, according this method might use their cellular telephones less than those in states, which are apply calling party pays method, and in addition penetration rates, could presumably be much less in contrast with calling party pays nations. In fact, proof for such behaviour was seen particularly in the early stages of cellular phone usage when a few nations applied receiving party pays method, e.g. USA. Substantive empirical evidence is not yet available to confirm the effect of paying system on penetrations rates.

However, Genakos and Valletti (2011) studied the effect of cellular termination charges on retail rates. They used the altered impact method while combining it with effective factors. They used a regression analysis and found that decreasing cellular termination charges would ultimately increase retail rates.

Veronese and Pesendorfer (2009) and Hansen and Andersson (2009) estimated the impact of MTRs on social welfare proxies consisting of mobile penetration, minutes that are of use and customer's rates (proxy by average revenue per minute). Their results showed that MTRs have significantly positive effects on customer's rates and mobile penetration. Cunningham et al. (2010) estimated the impact of MTRs on mobile subscriptions per person. They found that MTRs had a significantly positive effect on mobile subscriptions; however, the results showed coefficients that have an effect on the
interplay that exists among MTRs and a specific number of mobile service providers are significantly negative. These results propose MTRs could be assumed a flimsy factor in the competitive market. Growitsch, Marcus and Wernick (2010) estimated the effect mobile termination rates have on the end customer's rates using MTR lagged values as an instrument. Their results showed that lower MTRs also have a tendency to decrease the mobile end customer's rates incurred. Dewenter and Kruse (2011) compared the CPP and RPP regimes, similar to Littlechild (2006), but focused on the rate of penetration. They discovered that the effect of calling party pays method and the receiving party method are the same and thereby explained in his conclusion that the receiving party pays method can be deemed to be favoured as a bypass method that evade regulated charges. The methodologies are similar but the findings of those researches are irreconcilable.

4.6.5 Total Element Long-Run Incremental Cost

Networks are usually deemed to be build of various purposes or components. The total element long-run incremental cost (TELRIC) method enables computing of incremental costs, that has been defined, to a particular component. One cost finishes with the overall costs and is inclusive of the overall costs of each of the cost components. This in turn, where appropriate, has permitted the identification of costs and that of setting of cost-based prices for each of the types of network asset, in order to control the price that is incurred for the sale of those facilities to third parties.

TELRIC could be referred to as a regulatory body associated with Federal Communications Commission (FCC) and it has been introduced by the US government so that parts of common or joint costs could be assessed. Moreover, it should be mentioned that, the responsibility for the assessment of joint and common cost in the services is described by the FCC itself.

4.6.6 Stand-Alone Cost

The SAC (Stand Alone Cost) can be defined as the amount of cost an organisation could gain through producing certain services or bunch of services depending on its own product approaches and capital base. These gained costs are utilised by business
organisations for determining and developing their future business plans and activities mostly related to the long-run goals of the organisation and needs for the advancement of technological infrastructure.

What differentiates SACs from embedded costs within business organisations is that embedded costs in business organisations are generally the type of cost which is recorded in the company’s financial statements directly and do not consider the revenue requirements of an organisation, but SACs are focused on the revenue requirements of a business organisation for developing its outcomes. Generally, incurred embedded costs by an organisation indicates the inefficiencies of an organisation for adopting the most advanced technology in the relevant industry and inefficiency for high capital cost management as well.

It could be said that SACs to an organisation is the capital it could gain by being a new entrant in a service providing industry having a single service offering to the consumers. However, it should be mentioned that, starting from a zero position in a market even with a lack of variation of services it is harder for an organisation to incur profits by relying of SACs (Katz, 2009).

Going through the various kinds of cost we come across the role and importance that each cost plays in the production processes and in the process of providing the service. It is very important that a firm which sets out to operate must be well versed with all the costs and their related principles so that the production process is carried out smoothly. To get the maximum pure profit it is vital that all the costs are computed well by an expert separating short run cost and long run cost. This can be better grasped by studying the SRAC curve and LRAC curve and how they are inter related as shown by Harrod (1930) pp.216.

4.6.7 Interconnection Costing Approaches

In practice, there are some approaches that are commonly used for calculating the interconnection rates such as the following: (see Fig. 20) (ITU, 2010a):

1. Marginal Cost (MC)
2. Forward-Looking Long Run Incremental Cost (FL-LRIC)
3. Fully Distributed Cost (FDC)/Fully Allocated Cost (FAC)
4. Stand-Alone Cost (SAC)

It is notable that the Forward-Looking Long Run Incremental Cost (FL-LRIC) approach has been used by TRC and the telecommunications services providers in Jordan to calculate the interconnection rates since 2009. This approach promotes competition efficiency among the telecommunications companies as well as promoting effective economy.

4.6.7.1 Marginal Cost Approach
The calculated price based on this approach equals the variable cost component of the direct cost of the product or service attributed to this product or service (see Fig. 20). Practically, the marginal cost provision of an additional unit of service or product. Traditionally, in the case of companies that provide only one service or product, the efficient and effective method for regulating these companies is by using the Average Cost (AC) method to allocate its services cost. Therefore, it is easy to allocate the costs for this service or product; all the costs are solely for this service or product (Baumol and Bradford, 1970).

By contrast, currently, most companies provide more than one service, or product or are selling and providing their services in more than one market (Currier, 2011). But, if there is more than one service or product, it is difficult to allocate all the costs especially the joint costs (indirect costs) and common costs for each service or each product. So the best pricing method for this case is the Marginal Cost (MC) method (Kahn, 1988). In this vein, it is well known that this method of pricing (marginal costs) is considered the first-best method for pricing telecommunications services (Baumol and Bradford, 1970).

This methodology does not take the common costs or the joint cost (indirect costs) in calculating prices. Consequently, this method was one of the first methods used when the market was liberalised. This method was used in the natural monopoly market, which had only one dominant company. Additionally, the government usually subsidised the prices of the dominant company (Baumol and Bradford, 1970). Such firms would operate at a
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loss without government subsidies; prices should be higher than the marginal costs to produce some gains (De Bijl and Peitz, 2002).

The disadvantages of the marginal cost method are:

- The marginal cost method is used only for the regulated dominant firm in the natural monopoly market (De Bijl and Peitz, 2002).
- The marginal cost method does not cover fixed costs, although it covers variable costs. This means that the profit equals zero.
- Applying the marginal cost method, in the long run, will generate negative profit, and thus, the firm will be out of the market.
- Marginal cost method is more efficient and effective in a market without competition.

As a result, in the new economy, the MC of a service is negligible compared with the huge amount of fixed costs in the telecommunications industry, which are important to reinvestment in fixed assets to follow rapidly moving technological changes, which are necessary to produce modern services and products instead of manpower that costs direct wages on provision services and products. So, the most efficient approach should be taking into account the contribution of the fixed cost and appropriate amount of the common costs.

4.6.7.2 Forward-Looking Long Run Incremental Cost

This approach measures the cost using the forward-looking cost, and the current costs Modern Equivalent Asset methodology (MEA). According to this method, the price will be equal to the estimated costs (direct cost/variable cost plus the indirect cost/joint cost) of the modern equivalent technology (fixed assets). Thus, these costs represent the annual present value of efficient network elements of an efficient service provider (sometimes hypothetical operator) providing the interconnection service (Cave and Vogelsang, 2003; Cave, 2004).

This approach is recommended, as well as commonly used as a regulatory means by many telecommunications regulators around the world for calculating interconnection charges between service providers. Consequently, this methodology is considered as an
internationally recognised standard because most of the telecommunications regulatory commissions have recommended and adopted it. For instance: The Federal Communications Commission (FCC) in the USA, the European Commission (EC) in Europe and the Office of Communications (Ofcom) in the UK (Mandy and Sharkey, 2003; Vogelasang, 2003).

4.6.7.3 Fully Distributed Cost/Fully Allocated Cost
This methodology uses the historical costs of the existing network elements of a service provider. Thus, the calculated price will equal all allocated historical costs of a service by using mainly the Activity-Based Cost methodology to allocate all costs to all services.

Mandy and Sharkey (2003) noted that telecommunications services providers had used the FAC model to compute the cost of their service as well as to set competitive prices for these services. Therefore, they have to know exactly the cost for each service and/or product to allocate it with each service and/or product. This is because both of these methods (FAC and LRIC) have initially the same steps to calculate the price and cost (mainly ABC methodology to allocate the costs). So they used the Fully Allocated Costs (FAC) model prior to applying the LRIC model.

4.6.7.4 Stand-Alone Cost Approach
The price under this methodology equals all cost of interconnection services direct/variable cost, fixed/joint cost and all common costs (see Fig. 20). Thus, this methodology does not promote competition efficiency or even effective economics.

Figure 20 presents the fourth approach for calculating the cost of the interconnection services including MC, FDC/FAC, SAC and LRIC approach.
4.7 Comparison between the Interconnection Costing Approaches

However, it can be clearly seen that the outputs (costs and prices) that are calculated according to the SAC methodology have the highest value while the outputs of the LRIC approach have the lowest. Figure (21) shows the comparison between the interconnection costing approaches SAC, FAC, CCA and LRIC models (Bottom-Up and Top-Down approaches) according to the value of outputs that were calculated.
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4.8 Conclusion

The theoretical framework of this research is discussed further in this chapter. It introduced background information on the traditional cost accounting systems through the following sub headings: definition, function, importance and objectives, elements, concepts and criticisms. It also presented and further discussed the establishment of the cost accounting system based on the LRIC model by using the activities-based cost (ABC) methodology to allocate indirect cost. Essential liberalised utilities issues and why telecommunications industry needs to be regulated are introduced. Finally, some general costing and pricing methodologies in the telecommunications industry are addressed, taking into account interconnection-related issues in details.
Overview

This chapter presents in more detail the research model and conceptual framework used by the author to collect data from the research community. It illustrates the methodology, research design, data collection, objectives and hypotheses. It also discusses the questionnaires methodology.

This chapter addresses the statistical tools used to analyse the data collected from personal surveys with financial managers and the heads departments working in telecommunications companies in Jordan, and presents the point of view of the Jordanian regulator on LRIC pricing models, which have been adopted in the JTI. Further, this chapter illustrates some facts and figures for the JTI and the three Jordanian firms, Orange, Umniah and Zain.

5.1 Introduction

The principal issue of the thesis is the impact or the introduction of LRIC on the wholesale market in the JTI. The research methodology is used to achieve the research objectives. This study also measures the impact of implementing LRIC models on competition between the players and the impact on performances: financial, operational and competitive.

This thesis is concerned with two periods – 2006 to 2008 and 2010 to 2012 the interim period round 2009 covers the introduction of LRIC. This thesis also looks at the whole population; wholesale market, population of firms; Orange, Umniah and Zain, in this oligopoly industry. The data consisted of three elements: the financial and operational statements published by the three firms, the data has so far not been analysed from an academic or business point of view.
The procedure, therefore, was as follows:

First looking at the theoretical and applied literature on LRIC pricing, a conceptual model was formulated relating to firm’s performance and the introduction of LRIC. In defining efficiency this thesis looks at prices and costs in each of the three firms and looked at competition in the industry, it also looked at both financial and operational data.

Essentially this thesis examines four variables concerned with finance and four variables concerned with operational efficiency and the impact of LRIC on efficiency.

Other aspects that the thesis is concerned with, in terms of data collection and the data analysis, are the impact of LRIC on capital investments and the impact of LRIC on the ability of new firms to enter the industry. The financial and operational data of the three firms over the two periods was analysed and embedded in preliminary hypotheses, or propositions.

Many issues raised in the analysis concerned sensitive issues where a certain amount of confidentiality was crucial, the researcher was careful to retain the confidentiality, as the next step in the research process was to check hypotheses against the impressions and the interpretations of managers in the Jordanian telecommunication industry. There were follow-up surveys with twelve managers, three from each of the firms concerned and these included: Financial Managers, Cost Accountants, Accounts Managers (Chief Accountants), Quality Assurance Managers

5.1.2 Accuracy of the Published Data

The researcher was concerned with the reliability of that data, therefore, follow up surveys were deemed necessary to ensure this. Managers preferences differed, some were happy with filling in a written questionnaire on the spot, some indicated that they would prefer to have the questionnaire beforehand so they could consider their response; some preferred the researcher to fill out their responses as they gave them so they did not have to write themselves. The latter type of survey was useful because it combined in depth and form filling styles. It enabled respondents to consider confidentiality issues, which were embedded in the questionnaire. That meant that there were relatively few data
RESEARCH METHODOLOGY, RESEARCH MODEL, HYPOTHESES and DATA COLLECTION

points where it was felt that further supporting information was necessary. Valuable objective figures come out of financial and operational statements but what was also important were the impressions of managers on the impact of LRIC. The Likert scale, which was also used was concerned with the strength of the impact of LRIC in various ways.

5.2 The Research Model Conceptual Framework and Hypotheses

The research concerns the impact of the introduction of LRIC in 2009 by the regulator of the JTI. The impact on the three firms is investigated by an examination of three sets of performance indicators - financial, operational and competitive. An assessment of the impact is carried out by comparing data for each of the three firms, comparing the periods 2006-2008 and 2010-2012.

The research framework is demonstrated in Figure 22. The objectives necessary to address the research issue are set out in this chapter. The study draws on examination of published data, relevant literature and field work by the author from 2013-2014. In 2015 the analysis was completed and subsequently a number of drafts discussed.

Figure 22: The Research Conceptual Framework

For the most part, the telecommunications industry has advanced from an essential telephone service domain into a competitive business model offering several services with freedom of movement for subscriber. In monopoly periods, prices were frequently
not calculated on costs. Worldwide services, by and large, supported local services, income from universal services acted as a subsidy for national services. Given the strength of connection telecommunications and economic have with social advancement, it is vital that prices are calculated based on costs. The liberalisation of telecommunications industries in many nations including Jordan and the advancement of new services additionally brought about the requirement for control of interconnection between contending operators and increased the significance of cost modelling as well as pricing methodologies.

This study presents the application of the Long-Run Incremental Cost (LRIC) model in the JTI in terms of implementation and efficiency issues, and its impact on the performance of the firms in the JTI in relation to: Financial Performance, Operations and Competition (Gitman and Joehnk, 2001).

Based on the foregoing, the researcher developed the study model to be fit for the purpose of achieving the study objectives, then the researcher used this model to derive the main and sub-models, and the main and sub-hypotheses, which reflect the relationship between the use of LRIC and all Financial Performance, Operations, and Competition.

The conceptual model of the thesis is built upon competition theory which, as discussed in chapter 1, enabled the researcher to formulate the two testable hypotheses. It is appropriate at this stage to set out the sub hypotheses belonging to hypothesis 1.

H1: The application of LRIC models has had a significant impact on the performance variables of Orange, Umniah and Zain in the JTI.

H1a: The application of LRIC models has had a significant impact on the financial performance variables of Orange, Umniah and Zain in the JTI as measured by ROE, ROA, ROS and GPM.

H1b: The application of LRIC models has had a significant impact on the operational performance variables of Orange, Umniah and Zain in the JTI as measured by revenues, EBITDA, Net Profit and Capex.
H_{1c}: The application of LRIC models has had a significant impact on the competitive performance variables of Orange, Umniah and Zain in the JTI as measured by Market Share, Customers and Service Cost. These hypotheses lend themselves to a general equation.

\[ Y_i^j (FP, OP, CP) - Y_i^k (FP, OP, CP) + E = f(LRIC^{2009}) \] …………… (1)

Where \( Y_i^j(.)\) and \( Y_i^k(.)\): financial or operational or competition measures in periods i and k and LRIC^{2009} is Long Run Incremental Cost introduction in 2009.

In testing the hypotheses, the researcher was aware that although population data was available for the oligopolised wholesale sector of the JTI, the amount of data accessible covers a limited period. Only data for the three years post the introduction of LRIC in 2009 was available at the time of the research and a comparison was drawn with the three years prior to 2009.

5.2.1 The Main Model

The figure 23 presents the main formal model of this study:

Figure 23: The Main Format Model

* Source: Author’s own figure.
It is useful to present aspects of the research methodology and conceptual model in mathematical form, since this enables the reader, in principle, to identify and assess the procedure and results of the research. Essentially as stated in the introduction two periods are compared to elicit the impact of LRIC on performance and efficiency of the wholesale market of the Jordanian Telecommunications Industry (JTI); comparing two periods pre LRIC 2006-2008 and post LRIC 2010-2012, gathered between 2013 and 2015. The reader may recall that the JTI is an oligopoly industry, composed of three approximately equal sized firms, Umniah, Orange and Zain. Oligopolistic industries are associated with excess returns. The intention of the introduction of LRIC by the JTI regulator was to reduce excess returns and introduce a degree of competition.

To express the purpose of the research in a nutshell, it is to examine the extent to which this intention was achieved over the period concerned. The reader may raise the legitimate criticism that the period examined is relatively short that perhaps it is too early to tell and that the research is limited to a few variables associated with performance and competition. Whist recognising these drawbacks, in defence of the method it is noted that (a) the entire industry was examined (3 firms make up the industry, so the population rather than sample data was the basis of the findings), and (b) the regulator is concerned very much with short term outcomes and their implication for the future.

The basic conceptual model states that there is a dependence between (vectors of) performance variables and an independent variable LRIC, imposed in 2009 (LRIC\textsuperscript{2009}). The impact of LRIC can therefore be judged by the difference in performance of the three firms individually and collectively as between the two periods ($Y_j^i(.) - Y_j^k(.)$); where $j$ is an index of firms Umniah, Zain and Orange and $i$ indicates the period 2006 – 2008 and $k$ the period 2010 – 2012. Various measures are included in the vectors of dependent variables FP, OP and CP.

An error term must be included. In the diagram, it is referred to as interference. Clearly many factors affect performance other than LRIC; intra and inter firm factors; management, government policy, the macro economic and social environment. Clearly also there may be measurement errors. Together they make up a composite variable.
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denoted E. We assume that these factors affect all firms in a similar way, so that the discriminating variable is LRIC itself. It assumed that these composite interference factors E cancel one another out. Thus, interference is treated as a (composite) normally distributed variable with a zero mean.

These assumptions make the analysis feasible within the time limits of the thesis and the reader will be reminded of the limitations that may occur because of it.

From the above a Mathematical Model for this Vector can be derived:

\[ Y^i_{j}(FP, OP, CP) - Y^k_{j}(FP, OP, CP) + E = f(LRIC^{2009}) \]  \[ \text{……………. (1) } \]

*Where:*

LRIC 2009: Long Run Incremental Cost introduction in 2009

\( Y^i_{j}(FP) \): Competitive Performance measured as a vector:

[ROE, ROA, ROS GPM] in period i.

\( Y^k_{j}(FP) \): Competitive Performance measures as:

[ROE, ROA, ROS, GPM] in period k.

\( Y^i_{j}(OP) \): Competitive Performance measures as:

[Capex, EBITDA, Revenue, Net Profit] in period i.

\( Y^k_{j}(OP) \): Competitive Performance measures as:

[Capex, EBITDA, Revenue, Net Profit] in period k.

\( Y^i_{j}(CP) \): Competitive Performance measures as:

[Market share, customers, Service cost] in period i.

\( Y^k_{j}(CP) \): Competitive Performance measures as:

[Market share, customers, Service cost] in period k.

E: Constant Factor.

i: relates to competitive variables over the period 2006-2008

k: relates to competitive variables over the period 2010-2012

j: Orange, Umniah, Zain
Also, from the figure No (23) it can see that there are more than one Dependent Variables and only one Independent Variable, so the researcher prefers to derive three sub-Models from the main Model.

### 5.2.2 The Main Hypotheses

From the conceptual model of the study, the researcher has derived the main Hypothesis as follows:

\[ H_1 : \text{The application of LRIC models has had a significant impact on the performance variables of Orange, Umniah and Zain in the JTI.} \]

H1 comprises of 3 sub hypotheses (\(H_{1a}\), \(H_{1b}\) and \(H_{1c}\)) relating to the sets of performance indicators. The performance indicators are vectors of financial variables (ROE, ROA, ROS and GPM), operational (Revenue, Net Profit, EBITA and Capex) and competition (Market Share, Service Cost and Customer). The author is concerned that the hypotheses should be testable and is concerned the term significant could be construed to be vague. Therefore, when the results of the research are presented, care is taken to be precise about the significance. The published data analysed is in fact population data, in that sense it is a significant, simply because it is population data. Two time periods are compared which is useful in detailing the impact.

### 5.2.3 Significance in the Context of the Thesis

The author discusses two important aspects of significance in the context of the thesis: (a) in relation to identifying the impact of policy variables and (b) subjectivity.

(a) The impact of policy variables has to be discussed in relation to the intentions of policy. So the first step in assessing the impact of policy is to identify intentions. In the case of the introduction of LRIC into the JTI, as in the introduction of LRIC generally, the aim in the JTI was to reduce monopoly power, reduce excess earnings by incumbent firms. In interpreting the impact of LRIC the author (i) assesses whether significant impacts exist (or not) and (ii) interprets the significance in the context of the results of the analysis.
(b) Interpretation of the results has an inevitable subjectivity. To deal with the subject element, the author has attempted to make the research methods as transparent as possible. Hopefully the methodology is sufficiently transparent to enable the reader to make his or her own judgment about the reliability and validity of the author's interpretation.

The author’s main concern has been to make the research at least in principle reproducible. Many emerging nations have issues of transparency with respect to the published data. The author therefore, carried out the surveys with 51 representative managers. The surveys of course are samples of the population of the managers; hence, levels of significance are appropriate.

A further comment on significance is relevant with respect to H2

\[ H_2: \text{There is a significant relationship between the performance variables in the correlation matrix.} \]

Since correlation matrixes are calculated from population data they are significant, in so far as they exceed some arbitrary value; arbitrary, because authors have different views about what constitutes significant correlation, the author has decided on values greater than equal to + 0.5 in the correlation matrixes made up of dependent variables.

The question arises; \emph{are the correlation numbers consistent?} First, do variables that theory would lead us to expect to be positively related in fact, have positive correlation values. Second, \emph{do they exceed 0.5?} Third, \emph{should consistency be expected?}

To attempt to answer these questions, the author makes a bold assumption that capital markets in the JTI are weakly efficient; that is firm performance is capitalised into stock prices and ROE. Unfortunately, the three companies are international companies; Orange, Umniah and Zain are strategic business units of larger parent companies. Stock prices for business units’ companies of Orange, Umniah and Zain in JTI are not separable. Only ROE figures for Jordanian firms are available (Zain is a Kuwaiti investment, and Orange is a French investments, while Umniah is Bahraini).
If capital markets in Jordan are weakly efficient, we would expect some consistency (correlation coefficient at least 0.5 in the authors opinion) between the ROE's of respective companies and other related dependent variables. In the analysis chapters, the author considers whether this is the case.

5.2.4 The 1st Sub Model

The 1\textsuperscript{st} sub-Model, explains the relationship between applying the LRIC Model (as Independent Variable) and the 1\textsuperscript{st} Dependent variable from the Efficiency Vectors: Financial Performance. Figure 24 shows this relationship.

\textbf{Figure 24: The First Sub-Model}

<table>
<thead>
<tr>
<th>INDEPENDENT VARIABLE</th>
<th>DEPENDENT VARIABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Run Incremental Cost (LRIC) Model Application</td>
<td>Financial Performance</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>ROA</th>
<th>ROE</th>
<th>ROS</th>
<th>GPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Source: Author’s own figure.

The researcher hypothesises that there is a relationship between the Long Run Incremental Cost (LRIC) model independent variable and financial performance, a vector of dependent variables.

Dependent variables in the financial performance vector were selected from suggestions in the literature for example; Steven, (2007), Gitman and Madura (2001), Gitman, (2001). The indices/ratios used to calculate the 1\textsuperscript{st} efficiency vector and assess H1A are:

- ROE: Return on Equity
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- ROA: Return on Assets
- ROS: Return on Sales
- GPM: Gross Profit Margin

The model hypothesis $H_{1A}$, is that there is a significant impact of the introduction of LRIC in 2009 ($LRIC^{2009}$) on a vector of financial performance variables; that is for each $j$ there is the change in respective performance variables as between the years 2006-2008 and 2010-2012, $Y_j^i(FP) - Y_j^k(FP)$ is significant.

$$Y_j^i(FP) - Y_j^k(FP) + E = f(LRIC^{2009}) \quad ............ (2)$$

Where:

$LRIC^{2009}$: Long Run Incremental Cost introduction in 2009
$Y_j^i(FP)$: Financial Performance measures as: ROE, ROA, ROS and GPM in period $i$.
$Y_j^k(FP)$: Financial Performance measures as: ROE, ROA, ROS and GPM in period $k$.
$E$: Constant Factor.
$i$: relates to financial variables over the period 2006 – 2008
$k$: relates to financial variables over the period 2010 - 2012
$j$: Orange, Umniah, Zain

5.2.5 The 1st Sub-Hypothesis

From the 1st sub-model of the study the researcher has derived the 1st Sub-Hypothesis as follow:

$H_{1a}$: The application of LRIC models has had a significant impact on the financial performance variables of Orange, Umniah and Zain in the JTI as measured by (ROE, ROA, ROS and GPM).

And
The discussion of the research findings must (a) decide whether the impact of LRIC and (b) explain what the significance is.

5.2.6 The 2nd Sub Model

The 2nd sub-Model, explains the relationship between applying the LRIC Model (as Independent Variable) and the 2nd Dependent variable from the Efficiency Vectors: Operational Performance. Figure 25 shows this relationship:

**Figure 25: The Second Sub-Model**

The researcher hypothesises that there is a relationship between the Long Run Incremental Cost (LRIC) model independent variable and operational performance, a vector of dependent variables.

Dependent variables in the operational performance vector were selected from suggestions to measure the operational performance; the indices/ratios used to calculate the 2nd efficiency vector and assess H_{1b} are:

- Revenues
- EBITDA (Earnings before Interest, Tax, Depreciation and Amortisation).
- Net profit
• Capital expenditures (Capex)

The model hypothesis $H_{1b}$, is that there is a significant impact of the introduction of LRIC in 2009 (LRIC$^{2009}$) on a vector of operational performance variables; that is for each $j$ there is the change in respective performance variables as between the years 2006-2008 and 2010-2012, $Y_{ij}^{j}(OP) - Y_{ik}^{k}(OP)$ is significant.

$$Y_{ij}^{j}(OP) - Y_{ik}^{k}(OP) + E = f(LRIC^{2009}) \quad \ldots \ldots \ldots \ldots \ldots (3)$$

Where:

- LRIC$^{2009}$: Long Run Incremental Cost introduction in 2009
- $Y_{ij}^{j}(OP)$: Operational Performance measures as: Capex, EBITDA, Revenue and Net Profit in period $i$.
- $Y_{ik}^{k}(OP)$: Operational Performance measures as: Capex, EBITDA, Revenue and Net Profit in period $k$.
- $E$: Constant Factor.
- $i$: relates to operational variables over the period 2006 – 2008
- $k$: relates to operational variables over the period 2010 - 2012
- $j$: Orange, Umniah, Zain

5.2.7 The 2nd Sub-Hypothesis

From the 2$^{nd}$ sub-model of the study, the researcher has derived the 2$^{nd}$ Sub-Hypothesis as follows:

$H_{1b}$: The application of LRIC models has had a significant impact on the operational performance variables of Orange, Umniah and Zain in the JTI as measured by Revenues, EBITDA, Net Profit and Capex.
The discussion of the research findings must (a) decide whether the impact of LRIC and (b) explain what the significance is.

### 5.2.8 The 3rd Sub Model

The 3rd sub-Model, explains the relationship between the LRIC Model (as Independent Variable) and the 3rd Dependent variable from the Efficiency Vectors: competition. Figure 26 shows this relationship.

**Figure 26: The Third Sub-Model**

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Dependent Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apply the Long Run Incremental Cost (LRIC) Model</td>
<td>Competition</td>
</tr>
<tr>
<td></td>
<td>customers</td>
</tr>
<tr>
<td></td>
<td>Market share</td>
</tr>
<tr>
<td></td>
<td>Service Cost</td>
</tr>
</tbody>
</table>

* Source: Author’s own figure.

The researcher hypothesises that there is a relationship between the LRIC model independent variable and competitive performance, a vector of dependent variables.

Dependent variables in the competitive performance vector were selected from suggestions to measure the competitive performance; the indices/ratios used to calculate the 2nd efficiency vector and assess $H_{1b}$ are:

- Revenues
- Market share
- Customers
- Service Cost
The model hypothesis $H_{1c}$, is that there is a significant impact of the introduction of LRIC in 2009 ($LRIC^{2009}$) on a vector of competitive performance variables; that is for each $j$ there is the change in respective performance variables as between the years 2006-2008 and 2010-2012, $Y^i_j(CP) - Y^k_j(CP)$ is significant.

$$Y^i_j(CP) - Y^k_j(CP) + E = f(LRIC^{2009}) \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (4)$$

Where:

$LRIC^{2009}$: Long Run Incremental Cost introduction in 2009

$Y^i_j(CP)$: Competitive Performance measures as: Market share, customers and Service cost in period $i$.

$Y^k_j(CP)$: Competitive Performance measures as: Market share, customers and Service cost in period $k$.

$E$: Constant Factor.

$i$: relates to competitive variables over the period 2006 – 2008

$k$: relates to competitive variables over the period 2010-2012

$j$: Orange, Umniah, Zain

5.2.9 The 3rd Sub-Hypothesis

From the 3$^{rd}$ sub-model of the study, the researcher has derived the 3$^{rd}$ Sub-Hypothesis as follows:

$H_{1c}$: The application of LRIC models has had a significant impact on the competitive performance variables of Orange, Umniah and Zain in the JTI as measured by (Market Share, Customers and Service Cost).

And

The discussion of the research findings must (a) decide whether the impact of LRIC and (b) explain what the significance is.
5.2.10 Summary of the Models

In the next table No. 3 the researcher arranges all previous models, and the variables related to it, as much as possible to be clear to the reader.

Table 3: Summary of the Study Models

<table>
<thead>
<tr>
<th>S.N</th>
<th>Model</th>
<th>Independent Variable</th>
<th>Dependent Variable</th>
<th>Methods and Indices used to measure the Dependent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The Main Model</td>
<td>LRIC</td>
<td>All Efficiency Vectors</td>
<td>Financial Performance, Operational Performance, Competitive Performance.</td>
</tr>
<tr>
<td>2</td>
<td>The 1st Sub-Model</td>
<td>LRIC</td>
<td>Financial Performance</td>
<td>ROE, ROA, ROS and GPM.</td>
</tr>
<tr>
<td>3</td>
<td>The 2nd Sub-Model</td>
<td>LRIC</td>
<td>Operational Performance</td>
<td>Revenues, EBITDA, Net Profit and Capex.</td>
</tr>
<tr>
<td>4</td>
<td>The 3rd Sub-Model</td>
<td>LRIC</td>
<td>Competitive Performance</td>
<td>Market Share, Customers and Service Cost.</td>
</tr>
</tbody>
</table>

* Source: Author’s own figure.

5.3 Research Methodology

The research examines the impact of LRIC on performance; comparing two periods pre LRIC 2006-2008 and post LRIC 2010-2012, gathered between 2013 and 2015. The data set includes financial accounting data from published accounts and primary data drawn from surveys of managers in the three firms, the latter needed to overcome well-known issues of transparency and firm’s concerns about commercial sensitivity.

The research methodology addresses the research questions by accomplishing the research objectives as follows:
This study depends on a long tradition of literature in economic, financial, and accounting journals, books and articles. However, current literature focuses on the nature of the telecoms industry generally and in particular the JTI.

Financial data has been collected through published companies’ reports, including balance sheet and income statements for the selected firms in the JTI, which apply the LRIC model for costing and pricing its services. The data has been collected for two periods; before (Ex ante) and after (Ex post) applying the LRIC model. The accountant can read and understand this data and therefore, use it to measure the impact of applying the LRIC model on the financial performance of these firms. Moreover, financial performance will be measured through the four standard indicators according to Steven (2007) and Gitman (2001), which are: Return on Equity (ROE), Return on Assets (ROA), Return on Sales (ROS) and Gross Profit Margin (GPM).

Personal surveys were arranged with the financial managers in the selected firms in the JTI. This is completed as a means to check and validate findings and add support to this research.

**The logic of the methodology**

As noted above, over a necessarily short period, dramatic results could not reasonably be expected. So the path was chosen of digging ever deeper into the available data using competition theory as a guide. The path involved breaking hypothesis into three sub hypotheses 1; the first two sub hypotheses relating to financial and operational performance data; the third sub hypothesis relating to competition data – market share of the three firms, number of customers and the impact on service costs after the introduction of LRIC. Using competition data, the researcher to attempted to detect relative shifts in the market share of the three firms. Digging further into the data and extrapolating sales figures facilitated estimates of the impact of LRIC on (a) demand elasticity on the wholesale market and (b) cross elasticity with respect to changes in interconnection rates.
The logic of hypothesis 2 requires elaboration. The path referred to above is followed questioning whether there is a pattern to be found in the variables contained within the broader categories; financial, operational and competition. Market efficiency would lead to expect that the variables form consistent patterns; measures of rates of return, profitability, sales and number of customers in the wholesale market we might expect to be positively correlated. The pattern of these measures may also have been affected by such variables as CAPEX and service costs.

Heat maps are used to illustrate findings related to the second hypothesis leading to the recommendation that performance should be judged on the basis of groups of variables and interrelationships within groups, rather than treating performance measures.

5.3.1 The Research Philosophy and Pattern

Generally, the research philosophy is an "all-encompassing term that identifies with the improvement of learning and the overall quality of that learning." (Saunders et al. 2009:107p). It often contains presumptions about how the researchers see the world (ibid.). These suppositions support the researchers methodologies and techniques of analysing the data (Saunders et al. 2009; Blumberg et al. 2008). Research is impacted by past concerns and beliefs (Hoque and Hopper, 1994). This recognises the criticalness of considering the researcher (Blumberg et al. 2008). The concept of the research paradigm can be characterised as a general point of view or state of mind that reflects essential convictions and presumptions about the organisation’s nature (Gioia and Pitre, 1990). It is typically used to connect a method for studying an incident (Gill and Johnson, 2002). Another meaning of the research paradigm is that of a procedure of experimental enquiry taking into account individuals' methods of insight and presumptions about the world and the way information leads to understanding and an increase in human knowledge (Hussey and Hussey, 1997).

Burrell and Morgan (1979) proposed that the research paradigm which is characteristic in sociology is the subjectivist situation, which has a tendency to favour nominalism, non-positivist, voluntarism, and ideographic (subjective accentuation), the objectivist method, which has a tendency to lean toward realist, positivist, determinist and nomothetic
(quantitative accentuation). From one perspective, the nominalism (quantitative) is encapsulated in the technique utilised as a part of common sciences, concentrating on the procedure of speculations testing. This testing uses quantitative strategies, for instance questionnaire and survey; identity investigations and institutionalised examination instruments of numerous types are unmistakable among the apparatuses that contain nominalism philosophy (ibid.). Then again, the idiographic (qualitative) technique is identified with sociology, which is built up on the perspective that it is conceivable to comprehend the social world by getting immediate information of the subject under research. The qualitative methodology underscores the significance of giving one's subject a chance to reveal its inclination and attributes amid the procedure of examination (ibid.).

The objectivism measurement depicts the position that social substances exist in a reality outside; conversely, the subjectivism measurement holds that social incidents are made from the observations and subsequent activities of those social performers focused on their presence (Saunders et al. 2009). The contrast between subjectivism and objectivism is undifferentiated from that between the practical and interpretive methodologies. From one viewpoint, the sociology highlight of the functionalist paradigm is situated in objectivism and established in positivism, which endeavours to utilise scientific models and techniques to research human attitude (Burrell and Morgan, 1979). On the other hand, functionalism cannot present portrayals of social change (ibid.); it has an absence of research gathering (Otley and Berry, 1994). Then again, the interpretive methodology is situated inside subjectivism and social science. Ryan et al. (2002) distinguish the interpretive paradigm as focused on comprehending the social world, and focuses on a social way of accounting for practices. The interpretive paradigm incorporates subjectivist study, and the subjective implications that individuals connect to things (Lukka, 2010). Along these lines, the interpretive paradigm, which was embraced in this research study, concentrates on comprehending everyday life, which perceives that the world could be seen as socially constructed (Lukka, 2010; Ryan et al. 2002).

This research study needs a strategy that can assist the author to focus on clarifying the effect of the use of the LRIC model on the efficiency of firms in the JTI. Management
accounting traditions contends that there have been calls for more studies to be conducted from institutional viewpoints. This topic should be considered in more detail to give a command of the research scope. To accomplish that, the chosen paradigm must have the ability to understand the goals and aims of the research. Furthermore, institutional hypothesis perceives that information awareness has to be subjective (Scapens, 1994).

The interpretive paradigm is by all accounts reasonable for this study with a specific end goal to get a deeper understanding of the impact of the use of the LRIC model on the efficiency of firms in the JTI. In same manner, this research depends on both the interpretive paradigm and institutional hypothesis since they are useful in clarifying the impact of the application of the LRIC model on the efficiency of firms in the JTI. Moreover, the ontological and epistemological presumptions that support the interpretive paradigm are concurrent with understanding the institutional contextual model that is used to illuminate the contextual analysis of this JTI case-study. Scapens (1994) called attention to the fact that the institutional hypothesis has anthropological and cultural measurements. This leads to a premise for understanding the impact of the application of the LRIC model on the efficiency of firms performance, while both the institutional hypothesis and the interpretive paradigm consider that management accounting as socially built and comprises of an arrangement of guidelines and schedules that might be regulated and structured. The accompanying open deliberation supports this adoption.

Noticeable accounting researchers, particularly Anthony Hopwood, set out on another research plan. Hopwood (1976:1p) recognised the workings of accounting based on customary points of view as follows: "accounting can be seen as a fairly static and simply specialised incident. The reasons, procedures, and methods of accounting, its human, firm and social parts, and the route in which data is utilised will never be static". He likewise expressed that "there is presently a pressing requirement for study for considering accounting to be both a social and hierarchical context even what may be the entirely huge formal part of numerous accounting frameworks should be perceived,” (ibid.:P3). He has contended for no less than three decades that we ought to pay consideration to the authoritative and social settings in which accounting is practiced (Hopwood 1978).
Hopwood stated that they ought to take care of the external roots of internal records, that context ought not be considered as something external to firms, but rather as something that goes through them, and ought to consider accounting to be both modelled by, and forming, more extensive social procedures (Chapman et al. 2009; Burchell et al. 1985; Hopwood, 1983). This research is considered to be in accordance with this idea, and the methodology chosen supports a commitment in this ideology as the research needs a strategy for accomplishing this objectives. There has been no earlier evidence of studies or research on this topic in Jordan, thus, the topic must be examined in depth for adequate comprehension of the scope of the issues. A paradigm must be chosen which will accomplish the goal of the research. Scapens (1999) suggests management accounting research that utilises an interpretive approach, with a subjectivist stress is appropriate for studies such as this.

Generally, management accounting is perceived as unproblematic. In spite of the strength of those perspectives practical experiences of management accounting offers an alternative view: it concentrates on the setting as a given, and expects people and organisations to assume passive roles in connection to the function of accounting (Hopper and Powell, 1985). Dissimilar to functional analysts, interpretive researchers try to inspect how the setting can be an illustrative factor for understanding the application of the LRIC model from a management accounting viewpoint, and the transaction between the connection and the capacity of accounting (Burchell et al. 1980). In light of the flaws in the functionalist paradigm, interpretive researchers inspect how and why the application of the LRIC model exists and how it can be applied. This can empower decision makers by helping them to visualise the impact of the application of the LRIC model on the efficiency of the firms in the JTI from an unthinking to a post-robotic structure. These points of view principally draw on institutional hypotheses (Wickramasinghe and Alawattage, 2007). The key objective of these methodologies is to give clarification to the impact on the efficiency of the firms in the JTI from a sociological perspective.

Various management accounting scholars have utilised institutional points of view to decipher the procedures of management accounting (Ryan et al. 2002). Dillard et al.
(2004) and Burns and Scapens (2000) presented this methodology structure in their studies (Ryan et al. 2002). Also, an extensive number of accounting scholars have conducted studies using an interpretive approach (Lukka and Modell, 2010; Lukka, 2010; Kakkuri-Knuuttila et al. 2008). According to management accounting traditions, interpretive accounting study is regularly described by what it is not (non-standard) or alternative (Ahrens et al. 2008). Interpretive scholars try to understand the nature of management accounting, and how specialists practice their understanding (Scapens, 2008). Rather than utilitarian and radical methodologies, interpretive scholars are considered as supporting and endorse the present social, economic, financial and political demand (Hopper and Powell, 1985). A view about how accounting is identified with more extensive social and financial/economic procedures and structures can be gotten from research on the capacity of accounting and its association (ibid.).

More to the point, an interpretive accounting study can be seen as a free organisation of numerous conceivable outcomes (Baxter et al. 2008). Interpretive study has the likelihood of creating subjectivism as well as clarifications (Lukka and Modell, 2010). In such manner, Lukka and Modell (2010) looked at the approval of interpretive management accounting study from two focal elements, namely: genuineness and credibility (validity and reliability). The concept of validity can be fortified through the development of generally comprehensive clarifications offering voice to the next (ibid.: 474p). Reliability is significant for measuring the validity of the clarifications being created.

5.3.3 Research Method (Approach)

According to Saunders et al. (2009), it is helpful to use the study methodology that deals with the underpinning philosophy of the study, for instance: the deductive methodology is connected with positivism, while the inductive approach can be related to the interpretive approach. Inductive and deductive researches are viewed as unmistakable consistent procedures according to Goel and Dolan (2004). Insightfully, deductive and inductive approaches involve distinctive classes of thought (ibid.). According to Klauer et al. (2002) the inductive approach normally diverges from the deductive approach. Thorne et al. (1997) state that in subjective studies, an inductive approach as opposed to
deductive research is embraced. From one perspective, Collis and Hussey (2009) point out that the deductive methodology is research based on a conceptual framework and hypothetical structure examining the gathered data. Saunders et al. (2009) conclude that it intends to clarify causal connections amongst variables, and this will rely upon quantitative data. In this manner, it looks to create speculations from hypothetical suppositions and examine those hypotheses through experimental information (empirical data). More to the point, the deductive approach examines experimental perception; thus, specific cases are applied to the general. The deductive method shifts from the general to the specific or from hypothesis to empirical data (Saunders et al. 2009; Hussey and Hussey, 1997; Otley and Berry, 1994).

By contrast, according to Collis and Hussey (2009), inductive methodology is research conducted where the hypothesis is produced from experimental reality. Otley and Berry (1994) state that the inductive approach attempts to make generalisations from insight gained about what happened in a particular incident. Not at all like the deductive methodology, the inductive methodology relies upon subjective research (qualitative study) and close scrutiny of the topic under study. Since it involves shifting from individual perception to applications to the general, it shifts from the particular to the general or from information to hypothesis (Saunders et al. 2009; Hussey and Hussey, 1997).

As per the inductive methodology, researching of a smaller sample of the target population may be more fitting than using larger numbers, as would be used in the deductive methodology. Easterby-Smith et al. (2008) point out that the authors utilising this methodology will probably work with subjective information (qualitative) and use an assortment of techniques to gather information, keeping in mind the end goal is to build up various perspectives and make generalisation regarding the research population. Despite the large number of different strategies used in subjective (qualitative) studies in the management accounting discipline, few researchers have suggested that such techniques give a rich account of the topic. Subjective research strategies can give an in-depth understanding of how accounting and its standards are socially created and supported (Tikk and Almann, 2011; Navarro Galera and Rodríguez Bolívar, 2007; Ryan

As per the qualitative-interpretative methodology, the hypothesis should be utilised to give clarifications. The accounting hypothesis means to uncover and illustrate how process are created and repeated (Chua, 1986). This is consistent with the institutional hypothesis chosen for this research, while both institutional and interpretive methodologies take the processes of the management accounting to be socially developed.

Browne (2005) suggests that the subjective methodology (qualitative/inductive) tries to decipher the feelings of the human towards specific things and endeavours to develop methods for observing those things. Subjective and inductive approaches are identified within the interpretive method as pointed out by Easterby-Smith et al. (2008:421p) ‘this method tries to portray, decipher, make an interpretation of and generally grapple with signifying’. Morgan and Smircich (1980:491p) also stated that ‘subjective/qualitative study is a methodology instead of a specific arrangement of systems, and its suitability gets from the way of the social theory to be discovered and examined’. For this reason, this study chose a subjective and inductive methodology (qualitative) to deal with, comprehend and translate the impact of the application of the LRIC model in the JTI.

Filstead (1970) contends that a subjective study approach does not suggest that researchers cannot follow scientific methods for gathering data for the purpose of their research. In actuality, it indicates that, for legitimacy (and therefore dependability), it is fundamental to demonstrate the experimental social world as it really exists, as opposed to seeing the social world according to the author’s vision as illustrated by Lapsley et al. (2009). Subsequently, this approach was selected to provide a rich data and clarification of the impact of the application of the LRIC model in the JTI. To this end, this research used strategies that captured a wide range of issues in JTI and gives a unique insight into the accounting framework (Roberts and Scapens, 1985). Caba-Perez et al. (2009), however, stress that the key functions of management accounting cannot be recognised separately. Accordingly, the fundamental aims of this research is to identify the impact of the application of the LRIC model within the JTI in connection to its context. Thus, as
mentioned by Hopper et al. (2001), a case study contextual analysis will be the proper methodology for conducting this kind of study, which plans to comprehend the role of authoritative efforts on institutional action (in light of the fact that, the application of the LRIC model has been firstly adopted by the regulator). As such, Brignall and Modell (2000) suggest that the subjective methodology (qualitative approach) which in this research will be an interpretive contextual investigation (case study) to examine in depth the phenomena (which is the application of the LRIC model and its impact on the efficiency of the firms performance).

5.3.4 Research Strategy

In subjective methodology (qualitative approach), Flick (2009:133p) emphases that ‘strategies ought to be chosen and assessed by propriety to the subject matter of the research’. More to the point, Liguori and Steccolini (2011:22p) state that the data gathered according to subjective methodology (qualitative approach), ‘comprise of nitty-gritty depictions of surrounded circumstances, occasions, individuals, cooperation, and watched practices and noted attitude, direct citations from individuals about their encounters, states of mind, convictions, visions, and contemplations’. Similarly, Carlström (2012) explains that the case study methodology stresses examination of a set number of occasions or conditions and their connections. Maher et al. (2007) emphasise that case study methodology includes tools (surveys) that can assist in achieving the targets of the research, moreover, Campbell (1975) argued that the authors, who conduct such case studies will have a deep vision and be more familiar with the study population and the context in general. Supported by Scapens’s (1990) conclusion this methodology will help clarify the procedures of an organisation's conduct and attitude with the purpose of increasing knowledge and in-depth understanding and explanations for the entire phenomena.

The concept of the case study methodology can be clarified as:
‘an exact request that explores a current incident within the actual world context; and it will be used when there is an unclear issues related directly to the case context, this will be undoubtedly the motivation for using such this methodology, and in accordance with this will definitely needs several resources to be utilised as evidences.’ (Yin, 2003;23p)
Scapens (1990; 1992) listed several types of subjective methods that have been used commonly as part of Management Accounting studies for instance: the case study methodology, field studies and field questionnaires. Embracing an interpretive case study as a research methodology is suitable for explaining the impact of the application of the LRIC model on the efficiency of firms’ performance. Likewise, the ontological and epistemological suppositions that support the interpretive approach are in line with the hypotheses that the conceptual framework is based on to explain in depth the context of this research.

Scapens (1990) pointed out that the case study methodology can be used for different functions, for instance: adjectival functions, explanatory functions, demonstrational functions, empiricism functions, exploratory functions, commentary functions, exposition functions, investigational functions and logical capacities. Nevertheless, Bhimani (2001) and Hong (1991) explained the nature of the associations between two main types of case study context, inside the firm or outside the firm. As pointed out by Scapens (1990) the key role of the case study methodology, is that it is expected to clarify complicated connections, and then interpreted the results through the conceptual framework. In such manner, either a single case study or multiple case study methodology can be considered according to the needs of the study.

Ryan et al. (2002) and Scapens (1990) stressed that the interpretive contextual case study is viewed as the favoured study methodology, where the study inquiries these four types of questions what, why, how and when, in light of the fact that it allows an extensive variety of information to be gathered; the technique gives different points of view as well as empowering the collection of data straight from the source with no pre-planned thoughts about answers. Modell (2005) demonstrated that the contextual case study approach will provide more relevant comprehension of the study findings and clarify the problems that may result from the questionnaire approach. Similarly, Johnson (1992:189p) outlines the significance of the contextual case study strategy:

‘The proper way to know more about business, is that the business itself. thus, researchers can go direct to the relevant organisations and just from there it can be created the theories and developed. Otherwise, they could not generalised their findings
as well as make their contributions by provide more deep explanations isolated from the selected contexts (relevant organisations).’ Johnson (1992:189p)

In general, contextual case study strategies are not accurate enough and do not have enough bases on which to generalise findings and perhaps this is the main criticism of such methodologies (Lukka and Modell, 2010; Yin 2003; Baker and Bettner, 1997; Dixon and Smith, 1993). Jazayeri and Hopper (1999) explained that given this inability to generalise the findings from this kind of methodology, it can be argued for a generalisation of hypotheses and findings just in the case of examining and testing the research topics and contexts. By contrast, Scapens (1990) pointed that there is extensive potential for generalising the high quality data gathered with these kind of methodologies. In most cases, the researchers will be fully aware of reality of the social world, before conducting their case study, this could be another criticism for these methodologies according to Lukka and Modell (2010). Some researchers such as Hoque (2006) and Gummesson (2000) outlined a few impediments of the contextual case study methodology as an investigative strategy i.e. this methodology does not depend on statistical analysis so there is a absence of statistical analysis tools, also, it does not examine assumptions perfectly and as a result, the findings might not be generalised on the whole case context. Moreover, Scapens (1990) summarised a few limitations for the contextual case study methodology:

Initially, researchers face some difficulties when they are trying to identify the scope of the topic of their research. The alignment of the researchers usually emerges as a result of studying the real world that represents the case context. Moreover, some difficulties can emerge as a result of the researchers as they may deal with confidentiality issues during the study.

Bell (2010) and Lillis (2006) argued that the credibility and authenticity of a contextual case study methodology will be the main issue instead of generalising the findings. Along these lines, Gummesson (2000) pointed out that one of the usages of the contextual case study methodology is generalising the findings. More to the context, Scapens (1990: 278p) clarifies the main goal of the contextual case study methodology as:
'The common type of the contextual case study methodology that is widely used is the exploratory case study methodology. In general, a contextual case study methodology is concerned with clarifying and explaining the phenomena matter of the case studies instead of prediction. Researchers must not just think about generalising their findings. Contrary, researchers who just think to generalisation might be either rejecting their contextual case study strategies or not reaching to a full and deep understanding of the contexts matter of their contextual case study methodologies. Consequently, the successful contextual case study methodology in the management accounting is that making balance with concentrating on both generalisation and clarification'. (1990: 278p)

This research study will use an interpretive contextual case study methodology on the firms that work in the JTI.

5.3.5 Research Design Process

Generally, research design can be defined according to Yin (2003) as the logic and rational plan for any research is to move from A to Z or in other words, from ‘here’ to ‘there’, the research questions can represent the ‘here’ term, where any research might be started by formulating the relevant questions. While the results and findings can be represented by the term of ‘there’, which is the end of this of this research. Researchers generally experience some ordered stages, which include information gathering and testing the hypotheses. Scapens (1990) and Ryan et al. (2002) listed some common and logical sequence steps in any management accounting study, which are: readiness, gathering proof, evaluating proof, patterns' determination and clarification, theory advancement and writing the essay. Saunders et al. (2009:146p) indicated that, ‘In the event that you are utilising a contextual case study methodology you need to utilise and various sources of information.’ The design of the study according to Oliveira's (2010) argument generally utilises the hypothetically reliable decisions and techniques to meet the study aims and objectives. This case study is no different in that it strides to gather relevant proof to support or challenge the theories of this research.
5.3.6 Preparation

Voss et al. (2002) illustrated that any case study research should build up the conceptual framework (research model) and identify aims and objectives through the research questions that have been formulated. The relevant literature to the topic of this research has been reviewed in chapter two with a view to determining the boundaries of the study scope. Now it can move onto the process of gathering data from the relevant population. Scapens (1990; 2004) stated that the author should first understand the relevant existing theoretical issues, then secondly develop it through the adoption of a conceptual framework (research model). Chapter five has addressed the conceptual framework in detail.

Saunders et al. (2009) emphasised that information gathering relies on accessing proper sources. The suitability of a source relies upon the study aims and objectives, and related questions, consequently, the design of the study (research plan). However, Andrews (2009) pointed out that the physical access of the researcher will be the first priority, while obtaining the secondary data can be easier via the Internet. Moreover, Gummesson (2000) explained that researchers should acquire initial consent and approval from the relevant management in the firms under study, and thereby official permission is obtained through its management. Hopper and Armstrong (1991) and Ezzamel (1991) contend that different types of access should be taken into account in order to achieve the goals of the study.

The author focused on various techniques to obtain access to data e.g. developing existing connections with the JTI firms' managers, clarifying the reason for the data collection, contacting the relevant managers to encourage information gathering, welcoming their opinions and interpretations in terms of the application of the LRIC model. Saunders et al. (2009) stated that research might provide some advantages to the firms under study. Accordingly, this research study tried to identify the impact of the application of the LRIC model on the efficiency of the firms performance in terms of: financial, operational and competitive performance. Saunders et al. (2009) also maintained that utilising appropriate narrative plays a key role in accessing data.
Research ethics is concerned with the questions formulated by the researcher, the process of deciding on the topic of the study, drawing the study design, data access, information gathering, storing information, analysing it, presenting the study results (ibid). Saunders et al. (2009:183-84p) contend that, ‘Ethics shows the researcher attitude through conducting his study and how he is dealing with those who are affected by the topic of the study.’ The author must have completed the ethics forms for the study before collecting the data. Research ethics is extremely important in the process of gathering data, it is also imperative that in all the documentation that it is clearly stated that respondents were not forced to be involved and agreed to participate of their own volition. Sekaran (2003) recommends the researcher not be over-enthusiastic in their inquiries and avoid pushing or leading the survey for a reaction. Additionally, the researcher should not access any confidential or personal information without gaining consent.

The research community represents all the telecommunications companies operating in Jordan according to the definition of the License Articles, as well as the Telecommunications Law No. (13) of 1995 and its amendments (Articles: 6 (h) and 12 (a, 2)). This Act classified those telecommunications companies that are operating in Jordan into two main groups; according to the provision of telecommunications services and according to the Licenses that they possess, these two kinds of the Licensees are (TRC, 2011):

A- The Licensee who holds a Public Telecommunications Individual License and the number of those Licensees is (25) as shown in the TRC's annual report of the year of 2011.

B- The Licensee who holds a Public Telecommunications Class License and the number of those Licensees is (51) as illustrated in the TRC's annual report of the year of 2011.

5.3.7 The Research Sample

This research study population is the JTI, specifically those that have taken steps toward implementing the LRIC model. As a result, the statistical sample for this research represents the whole research community, and in order to reach those companies the author has implemented the following steps (Gitman and Madura, 2001):
**First step:** review the TRC’s records in order to obtain a list of the names and addresses of telecommunications companies operating in Jordan. According to the TRC’s records, the total number of telecommunication companies operating in Jordan at the end of 2011 was 76, all held approved licenses from the TRC according to the telecommunications Act.

**Second step:** is to use a comprehensive survey method for the research, which represents all the telecommunications companies that operating in JTI in order to gather the preliminary data related to the nature of the cost accounting systems applied, how they applied it, and when they launched it. This discussion was done through personal contact with the related TRC’s employee as well as over the phone conversations with the financial managers of these companies.

**Third step:** is to divide the research community into two main groups according to; the nature of the cost accounting system; whether it depends on the LRIC model, traditional cost accounting system or others:

- **First group** the telecommunications companies that do not apply the cost accounting system, which is based on the LRIC model. This group was compiled from telephone surveys with the financial managers of these companies. Out of 76 telecommunications companies, 73 fall into this category. These 73 telecommunications companies were excluded from this research.

- **Second group** the telecommunications companies that apply the cost accounting system based on the LRIC model. This group was compiled following telephone surveys with the financial managers of these companies. These companies amounting to three out of 76 telecommunications companies in Jordan. Therefore, this study only considered these three telecommunications companies.

**Fourth step:** is to reconnect with the same financial managers working within those telecommunications companies that apply cost accounting system based on the LRIC model. Because of the small number of companies the author organised a personal survey the pertinent heads of departments in order to collect detailed information regarding the
implementation of the LRIC model and to discuss in more detail the LRIC model with them.

The author designed the framework for the personal survey questions which consists of four main parts. The first part is designed to collect detail information regarding the surveyee’s personal information in terms of the job description, age, gender, current occupation, general experience and specific experience with the LRIC model. The second part is designed to measure the relationship between the application of the LRIC model and Financial Performance, and also to assess the strength of the relevant impact of adopting the LRIC model in the company through Financial Performance indicators. The third part is designed to measure the relationship between the application of the LRIC model and Operational Performance, and also to assess the strength of the impact of adopting the LRIC model in the company through Operational Performance indicators. The last part aims to measure the relationship between the application of the LRIC model and Competitive Performance and to further assess the strength of the impact of adapting the LRIC model in the company through the Competitive Performance indicators (Katz, 2009).

**Fifth step:** is to enrich the research subject matter with further detail of the situation, to gather information through the opinions of specialists who are working in these companies. Surveys were arranged and conducted over a period of two months.

**Sixth step:** to categorise the research community based on the results of the personal surveys from which the following categories arose:

- **First category:** those telecommunications companies that were not consider for surveys due to the company being under liquidation e.g. Batelco and XPress. They will not provide telecommunications services anymore and for this has been excluded from the research.

- **Second category:** those telecommunications companies that have not implemented the LRIC model and were still dependent on the traditional accounting systems. These companies could be questioned about the barriers in relation to applying the LRIC model from their point of view. Their answers could be analysed to illustrate obstacles and barriers associated with applying the LRIC models. Thus, the result
could be included in the epilogue under the research recommendations but, for the purpose of this study, they have also been excluded from the research.

- **Third category**: those telecommunications companies still in the process of applying the LRIC model, but still depend on the traditional cost accounting systems, there is no company under this category.

- **Fourth category**: those telecommunications companies applying the LRIC model. All personal survey questions were directed to financial managers which have been included in the research. There are three companies located under this category, Orange, Umniah and Zain and those companies represented the whole research community.

**Seventh step**: has been the collection of financial data (accounting data) from the annual audited accounts of the three telecommunications companies mentioned above. Data has also been collected through annual financial reports of these companies, which includes financial data between the period of 2006-2012. This data is necessary in order to conduct analysis and to embed illustrated examples for LRIC model outputs. This helps, to clarify the impact of applying the LRIC models on performance, efficiency and implementation issues in the JTI.

**5.3.8 Data Collection**

In order to achieve the research objectives, there is a methodology that is generally accepted for this kind of research. This methodology depends on a comprehensive review of the literature related to the research subject. Additionally, it is also important to conduct a comprehensive survey of the research community that represents all the telecommunications companies operating in Jordan between the periods of 2006-2012.

The author also previously conducted a prospective study to identify the possibility of obtaining the necessary financial data related to the research subject in order to test the feasibility of this research. In addition, the researcher did several field visits to the Telecommunications Regulatory Commission (TRC) as well as some telecommunications companies in Jordan, in order to strengthen relationships and increase the level of trust in the research process. During these visits, information regarding the research study, such
as research objectives, its academic nature and other information was shared. Moreover, the researcher assured confidentiality and privacy of financial data and other information. The author will not use this data for purposes outside to the scope of this research or disclose to competitors.

5.3.9 Data Sources

There are two main sources of data for this research secondary and primary, the secondary sources include:

- The Governmental Sources: The FAQ, Legal Articles, the manual of the licensed telecommunications companies, which includes public data about these companies their addresses, names and other relevant data and any instructions published by the TRC from the time of establishment to the present time.
- The relevant books as well as articles, periodicals, references and previous studies that relate to the research subject, whether electronic or hard copy.
- The relevant reports and laws that are issued by formal authorities.
- Websites related to the research subject.

The primary data was sourced from a number of different resources, namely

- The annual financial audited statements of the telecommunications companies operating in Jordan, which apply the cost accounting system based on the LRIC model between the periods of 2006-2012. To obtain the data knowledge of their main resources for publishing data was needed, whether the data is published by the Amman Stock Exchange (ASE) or the data is published on the official website of these companies.
  - Jordan Telecom Company (Orange).
  - Umniah Mobile Company (Umniah).
  - Jordan Mobile Telephone Services Company (Zain).
- For the purposes of gathering the necessary data for the research, the author has designed a conceptual framework which has been adopted as a measurement tool for gathering and analysing the data. This conceptual framework includes the following factors:
- The Financial Performance factor.
- The Operational Performance factor.
- The Competitive Performance factor.

**Validity Coefficient**

This means that the tool (survey) should measure what it was designed for. Therefore, the validity of the tool adopted is judged on its ability of its content to measure the research dimensions and its concepts. The author follows the arbitrators’ validity style, where the interview text will be displayed to many specialists in similar studies to ascertain the veracity of the interview (Macher and Richman, 2008).

**Reliability Coefficient**

This means that the questions in the data collection instrument used (survey) should be consistent with each other, which leads to consistency of the results ultimately. The reliability measurement tool was based on the Cronbach’s Alpha Coefficient that uses the objective and essay questions. According to Sekaran (2005), the minimum acceptable is (60%).

The personal survey in this study depends on the questions that exist in the questionnaire. The researcher uses Cronbach’s Alpha Coefficient to examine the consistency of the questions in the questionnaire that was introduced to the respondents.

**5.3.12 The Statistical Design of the Research and the Data Analysis Methods**

The selection of the data analysis method depends on the nature of the research study; therefore, this study requires statistical data analysis in order to optimise the data analysis. Statistical Package for Social Sciences (SPSS) program is best suited to analysis the data. The analysis will depend on two types of the statistical methods, the descriptive method and the analytical statistical method.

With regards to the descriptive approach, the phenomenon will be studied with all relevant descriptions and information. This approach has been used to describe the
implementation of the LRIC models in the Jordanian telecommunications companies during the specific period. In contrast, there are some statistical methods which will be used to identify the characteristics and features of the research community structure (Niemann and Shapiro, 2008). The following is some of the statistical tools that will be used later and the justifications for using each one of them:

- Recurring Distribution
- The Arithmetic Mean
- Standard Deviation
- Correlation coefficient
- The level of significance

5.4 The Research Population

5.4.1 Orange

Jordan Telecom Group (JTG) assumes a major part in the telecommunications market, it has a comprehensive line up of cellular, fixed, and internet services giving it a strong base in the Jordanian telecommunications sector with its local and international offerings, it is the largest of its kind in the sector. Jordan Telecom Group, in 2006, consolidated its four organisations under the group's name, turning into one operator. In 2007, the Orange brand was embraced – the business brand of France Telecom Group – denoting another accomplishment for the Jordanian telecommunications industry. This step furnished the Jordanian telecommunications industry with international level services provided by the Orange trade mark, which serves approximately 190 million subscribers from 220 nations around the world.

From that point forward, Orange Jordan made excellent telecommunications services accessible to its subscribers by providing varied services at moderate charges, the latest being the presentation of its 3G+ system, this service give Orange Jordan the exclusivity for offering the 3G+ services in Jordan (Mason, 2008).

With its capacity to call upon the experience of its French partner and principle shareholder, Orange Jordan keeps on providing the telecommunications sector with
international telecommunications standards, supported by cutting edge innovative system that covers Jordan completely. Orange Jordan Techno Centre works as a main access for all France Telecom – Orange members in the AMEA area that want to have access to dedicated developments.

With a firm responsibility to the community, Orange Jordan has set-up business objectives that lie in accordance with reasonable advancement in Jordan, trying to accommodate development and competitiveness with its dedication to social improvement and change.

The Orange Jordan now has more than 2.9 million subscribers with top innovations and world class service standards provided at very reasonable charges (Official Website: www.Orange.jo).

Performance in 2012 witnessed a drop in the total revenue by 0.9% to reach JD 408.0 million in 2012 against JD 411.8 million in 2011 due to high competition in the market and the difficult economic situation in the region especially the business sector.

The terms Operating expenditure (OPEX) implies the services costs, offering and costs related to apportionment, administrative costs, brand charges, government returns portion, and business support charges. The OPEX rose around 1.4% to achieve JD 252.5 million in 2012 compared with JD 249.1 million in 2011.

This increase is attributable to higher electricity expenses as a result of the government decision to increase telecom electricity charges by around 150%, and interconnection costs, mainly from higher international interconnection volumes. These increases were partially offset by a decrease in commercial expenses (Porter and Kramer, 2011).

The key element of operating expenditures is services costs which incorporates interconnection charges for using other networks of local and international services providers, particular permit expenses, technical expenses, for example, system working and repairing costs (including electricity), relevant costs with specialised technicians and furthermore, customer identity card (SIM) expenses, prepaid top-up cards and the
Expense of subsidised mobile phones (Annual report and financial Statements published by Orange Company at the end of fiscal year 2012).

Expense of facilities expansion with 3.5% achieving JD 173.2 million in 2012 against JD167.3 million in 2011. This increment brought from the increase in the interconnection volumes and costs in addition to the increase in technical electricity expenses. Marketing as well as apportionment costs diminished around 1.4% achieving JD 37.7 million in 2012 against JD 38.2 million in 2011. Administrative expenses decreased by 0.2% to reach JD 24.8 million in 2012 against JD 24.9 million in 2011. This decrease in sales distribution and administrative costs were brought from the cost optimisation program implemented by the group.

Earnings before Interest, Tax, Depreciation and Amortisation (EBITDA) comprise of selling revenues minus working and productive costs. While here, the EBITDA demonstrated a reduction with around 4.5% achieving JD 155.8 million in 2012 against JD 163.1 million in 2011. This fall is mainly because of the rise in the working and productive costs and the reduction in Orange's revenues. EBITDA dropped to 38.2% in 2012. Figure 27 illustrates some of these results.

**Figure 27: Revenue, EBITDA and OPEX: Orange**

*Source: Orange ANNUAL REPORT I 2012, (MJD: Million Jordan Dinar).*

The following table shows sales revenues, working and productive costs and EBITDA for Orange for the period 2011-2012.
Table 4: Summary of consolidated Income Statement

<table>
<thead>
<tr>
<th>Description</th>
<th>2012</th>
<th>2011</th>
<th>Change %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orange fixed, Orange internet and Light speed</td>
<td>297.6</td>
<td>289.7</td>
<td>2.7%</td>
</tr>
<tr>
<td>Orange mobile</td>
<td>195.1</td>
<td>203.6</td>
<td>(4.2)%</td>
</tr>
<tr>
<td>Intercompany</td>
<td>(84.7)</td>
<td>(81.5)</td>
<td>3.9%</td>
</tr>
<tr>
<td>Total Revenues</td>
<td>408.0</td>
<td>411.8</td>
<td>(0.9)%</td>
</tr>
<tr>
<td>Operating Expenses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orange fixed, Orange internet and Light speed</td>
<td>(211.7)</td>
<td>(196.0)</td>
<td>8.0%</td>
</tr>
<tr>
<td>Orange mobile</td>
<td>(125.2)</td>
<td>(134.2)</td>
<td>(6.7)%</td>
</tr>
<tr>
<td>Intercompany</td>
<td>84.7</td>
<td>81.5</td>
<td>3.9%</td>
</tr>
<tr>
<td>Total Operating Expenses</td>
<td>(252.3)</td>
<td>(248.7)</td>
<td>1.4%</td>
</tr>
<tr>
<td>EBITDA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orange fixed, Orange internet and Light speed</td>
<td>85.8</td>
<td>93.7</td>
<td>(8.4)%</td>
</tr>
<tr>
<td>Orange mobile</td>
<td>69.9</td>
<td>69.4</td>
<td>0.7%</td>
</tr>
<tr>
<td>Total EBITDA</td>
<td>155.8</td>
<td>163.1</td>
<td>(4.5)%</td>
</tr>
</tbody>
</table>


The following table presents the revenues over time, distributions, shareholders’ equity and market value of shares published by Orange for the period 2008-2012.

Table 5: The Time Series for some Financial Indicators: Orange

<table>
<thead>
<tr>
<th>Description</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profits in (JD)</td>
<td>100,298,024</td>
<td>104,029,766</td>
<td>95,082,809</td>
<td>89,799,214</td>
<td>83,096,208</td>
</tr>
<tr>
<td>Distributions (JD)</td>
<td>100,000,000</td>
<td>105,000,000</td>
<td>97,500,000</td>
<td>90,000,000</td>
<td>82,500,000</td>
</tr>
<tr>
<td>Growth %</td>
<td>40%</td>
<td>42%</td>
<td>39%</td>
<td>36%</td>
<td>33%</td>
</tr>
<tr>
<td>Shareholders equity in (JD)</td>
<td>416,502,433</td>
<td>420,532,199</td>
<td>410,615,008</td>
<td>402,914,222</td>
<td>396,010,430</td>
</tr>
<tr>
<td>Share prices (JD)</td>
<td>4.82</td>
<td>5.17</td>
<td>5.38</td>
<td>5.53</td>
<td>5.30</td>
</tr>
</tbody>
</table>

* Source: Orange ANNUAL REPORT I 2012, (JD: Jordan Dinar).
5.4.2 Zain

Zain was established in 1995, it was the main provider of cell phone services into the Kingdom. In only a couple of years, Zain gained notoriety for being the most dynamic telecom cellular services provider in the area in terms of competitiveness, willingness to embrace new advances, extending services and put resources into community improvement through its corporate social responsibility agenda. In expanding its core values to learning and physical fitness, youthfulness and games, and social improvement it made itself a good example for corporations in the Kingdom.

Since its origin, Zain Jordan has seen a tremendous growth of clients, with the quantity of subscribers surpassing 4.04 million, and a 39% share of the market with 3544 mobile sites, Zain covers all of Jordan.

Zain procured the permit to provide 4G+ services exclusively in Jordan, these services provides more than 150 Mebibyte/second. In 2014, Zain delivered LTE services to incorporate every one of the governors of Jordan.

This vision and confidence to embrace change, better serves clients and the community and has made Zain Jordan a mainstay of the domestic economy. It employs more than one thousand Jordanians and has made openings for one thousands more. It was not surprising then, when Zain Jordan allied with the Zain Group in 2003 (in the past known as the Mobile Telecommunications Company (MTC)) the arrangement was the biggest private segment investment in the Kingdom (Official Website: www.jo.Zain.com).

Zain’s has a number of firsts to claim:

- It was the primary Middle Eastern service provider to start MMS, infotainment solutions and cellular data services.
- The first to present WAP network in the Kingdom.
- The first to frame cellular banking collaborations with important banks in the Kingdom and the first to bolster BlackBerry correspondence services in the Kingdom.
In 2012, Zain was the first in Jordan to start Zain E-mail facilities. The facilities are predominantly about making a default portfolio to be gotten to and controlled from Zain client's cellular handset which will be used as an optional reimbursement process. Around the same time, Zain started high speed internet services through present day HSPA+ innovation. The new progressive and easy to use services provided remarkable speed for cellular web services across the Kingdom (Official Website: www.jo.Zain.com).

In spite of extraordinary competition in this free business sector, Zain has stayed the main mobile telecom provider in Jordan, the figure (28) shows the costumers for two years (2011, 2012):

Figure 28: the Customers in Zain During 2011 and 2012

Huge cost rivalry and falling charges describe the Jordanian telecommunications industry, however, Zain improved its market share to 38% in 2012, (from 37% in 2011). Zain had 3.5 million subscribers in 2012, indicating a dramatic increase of 27% contrasted with 2011. This base represented 8% of Zain's aggregate subscriber base in 2012.

Zain produced aggregate income of USD 509.3 million in 2012, up 0.7% Year on Year. However, net profit achieved USD 121.6 million, diminishing 8% when contrasted with 2011, and EBITDA fell by 2% to USD 225.7 million because of the roughly 150%
expansion in electric power prices particularly for the telecom industry. Zain did contribute 11% to the Group's merged incomes.

Capital expenditures for the year saw an increase of 34% to reach USD 32 million. And the figure shows the Market share for Zain compared with other companies related to this study in 2012 (Annual report and financial Statements published by Zain Company at the end of fiscal year 2012).

**Figure 29: Market Share of Zain, Orange and Umniah**

Zain concentrates on keeping its business sector power by keeping existing clients and expanding its market share. Zain expects to accomplish this by providing services that meet the demands of the business sector, with a specific emphasis on internet, where penetration rates are still relatively weak. As of 2012, Zain Jordan accomplished 100% 2G scope and 97% HSPA+ scope for the populous region, expanding its aggregate number of mobile sites to 1,597 (Annual report as well as finance related Statements distributed by Zain Company toward the end of monetary year 2012).

Table (6) shows the growth in 2012 Vs 2011 for: Customers, Revenues, EBITDA (Earnings before Interest, Tax, Depreciation and Amortisation), Net profit and capital expenditures.
Table 6: Operational and Financial Performance (YoY growth)

<table>
<thead>
<tr>
<th>Operational and Financial Performance</th>
<th>2012</th>
<th>2011</th>
<th>2010</th>
<th>YOY Growth (12 vs. 11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customers (000s)</td>
<td>3489</td>
<td>2751</td>
<td>2488</td>
<td>27%</td>
</tr>
<tr>
<td>Revenues (USD m)</td>
<td>509.3</td>
<td>505.8</td>
<td>514.2</td>
<td>1%</td>
</tr>
<tr>
<td>EBITDA (USD m)</td>
<td>225.7</td>
<td>231.5</td>
<td>228.5</td>
<td>(3%)</td>
</tr>
<tr>
<td>EBITDA %</td>
<td>44%</td>
<td>46%</td>
<td>44%</td>
<td>-</td>
</tr>
<tr>
<td>Net Profit (USD m)</td>
<td>131.6</td>
<td>131.6</td>
<td>143.9</td>
<td>(8%)</td>
</tr>
<tr>
<td>ARPU</td>
<td>$15</td>
<td>$15</td>
<td>$16</td>
<td>-</td>
</tr>
<tr>
<td>Capex (USD m)</td>
<td>23.8</td>
<td>23.8</td>
<td>70.9</td>
<td>34%</td>
</tr>
</tbody>
</table>

* Source: The Financial Statements for Zain Company for three years (2010, 2011 and 2012) (was used three fiscal years to calculate the Growth for 2 years).

5.4.3 Umniah

Ever since its official commencement on the 26th of June, 2005, Umniah has achieved success. Umniah is an auxiliary of Batelco Bahrain and has situated itself as an effective services provider in the Kingdom’s telecommunications market, providing top services, including cellular, broadband, and business arrangements, for good value and at the at an advanced level in the industry.

In 2014, Umniah achieved more than 3 million subscribers - a piece of the overall industry of more than 31.5%. Internet services saw a 100% development in 2 years, with wireless internet services stretching to 80% of the Kingdom’s citizens. The Umniah Mobile Company added to the growth of the cellular business sector in penetration rates, it started with 26% in 2005 and was higher than 135% in 2013.

In June 2012, Umniah propelled its ultra fast 3.75G system, controlled by HSPA+ innovation. This broadband service provides the most recent technologies in cellular broadband internet to the Kingdom (Mayer, 2015).

Umniah is a mainstay in the Kingdom's telecommunications industry because of it has a solid methodology of providing brilliant coordinated services, at sensible prices, while staying up-to-date with segment advancements and subscribers' different requirements and desires.
5.5 Conclusion

This chapter presented in more detail the research model and conceptual framework used by the author to collect data from the research community. It illustrated the methodology, research design, data collection, objectives and hypotheses. It also discusses the survey and questionnaires methodology.

This chapter addressed the statistical tools used to analyse the data collected from personal surveys with financial managers and the heads departments working in telecommunications companies in Jordan, and presents the point of view of the Jordanian regulator on LRIC pricing models which have been adopted in the JTI. Further, this chapter illustrated some facts and figures for the JTI and the three Jordanian firms, Orange, Umniah and Zain.
CHAPTER SIX
DATA COLLECTION AND ANALYSIS

Overview

This chapter presents the data collected in detail; it describes the statistical analysis and draws out the findings and results.

The development of the chapter is as follows. It begins by relating the research data gathered over the period to the hypotheses and their expression in equation form. It is appropriate first to consider the three sub hypotheses H1A, H1B, H1C and then consider hypothesis H1 in its entirety, which is contingent on findings with respect to sub hypotheses.

For the reader’s convenience, results relating to the first hypothesis are summarized before they are discussed in more detail later in the chapter. At the end of the chapter the author has provided a summary relating to the hypotheses as set out in an earlier chapter.

In the case of Orange, there is no marked change in the financial performance ratios over the period of study with the exception of GPM where there was a dramatic fall (almost 50%) between 2006 and 2007, prior to LRIC and a 30% for post LRIC. There appears to be no marked change over the period in any of the performance ratios, neither in the overall period nor on a year-on-year basis.

With respect to Umniah, high volatility in financial performance can be seen year on year over the entire period. Given the lower base at the beginning of 2009 if anything volatility of financial performance year-on-year has improved post LRIC. On the basis of the data it seems that operational measures have not significantly changed as a result of LRIC. One result however is that steeply climbing revenues prior to LRIC (approximately a 90% rise 2006 to 2009) seem to have been halted (falling to around 15% between 2009 and 2012).

As mentioned previously, the data collected relied on a number of sources; published data, existing literature and research, including legal articles and materials published by
DATA COLLECTION AND ANALYSIS

TRC. This is supported by primary research conducted using the questionnaire and survey method. The study period covers seven fiscal years, three years before and three years after the implementation of the LRIC model, the year in which the LRIC was introduced represents the differentiation point between the years under study.

2006-2008: the period before introduction of the LRIC model
2009: the fiscal year when the LRIC model was introduced
2010-2012: the period after introduction of the LRIC model

6.0 Data Collected from the Annual Financial Statements

6.1 The First Sub-model (Financial Performance)

Behaviour of Financial Performance Ratios - Time Series Data

In this section of the study, the data collected is displayed. It is divided as follows: the two basic variables; the order of hypotheses and models, and the different study periods. Data collected during the period 2006 - 2012 and serves the first sub-model

6.1.2 Jordan Telecom Company-Orange

After analysing financial statements and financial reports for the years 2006-2012, the table below has been organised to illustrate the variables of the first sub-model in order to judge Financial Performance by the following variables:

- ROE: Return on Equity
- ROA: Return on Assets
- ROS: Return on Sales
- GPM: Gross Profit Margin
Table 7: Financial Performance of Orange 2006-2012

<table>
<thead>
<tr>
<th>Year</th>
<th>ROE</th>
<th>ROA</th>
<th>ROS</th>
<th>GPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>21.70%</td>
<td>14.50%</td>
<td>37.10%</td>
<td>66.03%</td>
</tr>
<tr>
<td>2007</td>
<td>22.90%</td>
<td>14.10%</td>
<td>23.54%</td>
<td>32.82%</td>
</tr>
<tr>
<td>2008</td>
<td>24.10%</td>
<td>14.70%</td>
<td>25%</td>
<td>34.13%</td>
</tr>
<tr>
<td>2009</td>
<td>23.90%</td>
<td>15.30%</td>
<td>25.90%</td>
<td>33.44%</td>
</tr>
<tr>
<td>2010</td>
<td>22.90%</td>
<td>14.10%</td>
<td>25.80%</td>
<td>33.33%</td>
</tr>
<tr>
<td>2011</td>
<td>22.10%</td>
<td>13.60%</td>
<td>28.70%</td>
<td>21.80%</td>
</tr>
<tr>
<td>2012</td>
<td>20.80%</td>
<td>12.70%</td>
<td>27.20%</td>
<td>20.40%</td>
</tr>
</tbody>
</table>

The table contains the Ratios which were calculated for indicators of financial performance for Orange during the entire study period. The following is an explanation of the behaviour of these ratios before and after implementation of the LRIC Model.

Figure 30: Financial Performance Ratios - Orange

Figure 30 shows, the behaviour of financial performance ratios of Orange before the LRIC model, and it is clear that the GPM ratio saw a sharp drop from 2006-2007, the
ROS ratio also dropped in the same period but less than the GPM ratio. On the other side; GPM and ROS were stable from 2007-2008 with some minor changes.

From the figure, it is clear that ROA and ROE ratios have been stable from 2006 to 2008, and if there were increases or decreases in these ratios, they were very slight.

This figure also shows the behaviour of financial performance ratios for Orange after using the LRIC model, and it is clear from that the GPM ratio saw a sharp drop from 2010-2011, but all other financial performance ratios including ROA, ROE and ROS seem to have been stable over 2011-2012, if there was an increase or decrease in these ratios, it was very slight.

6.1.3 Umniah Mobile Company-Umniah

After evaluating the financial statements and financial reports for the years 2006-2012, the below table shows the variables that serve the first sub-model, which will used to judge the Financial Performance in terms of the following:

- ROE: Return on Equity
- ROA: Return on Assets
- ROS: Return on Sales
- GPM: Gross Profit Margin
Table 8: Financial Performance 2006-2012 Umniah

<table>
<thead>
<tr>
<th>Year</th>
<th>ROE</th>
<th>ROA</th>
<th>ROS</th>
<th>GPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>27.45%</td>
<td>27.55%</td>
<td>38.46%</td>
<td>35.89%</td>
</tr>
<tr>
<td>2007</td>
<td>24.50%</td>
<td>14.17%</td>
<td>43.50%</td>
<td>37.40%</td>
</tr>
<tr>
<td>2008</td>
<td>23.16%</td>
<td>14.98%</td>
<td>29.15%</td>
<td>32.73%</td>
</tr>
<tr>
<td>2009</td>
<td>21.42%</td>
<td>16%</td>
<td>31.20%</td>
<td>31.90%</td>
</tr>
<tr>
<td>2010</td>
<td>17.44%</td>
<td>5.30%</td>
<td>13.10%</td>
<td>35%</td>
</tr>
<tr>
<td>2011</td>
<td>16%</td>
<td>6.40%</td>
<td>15.20%</td>
<td>30.10%</td>
</tr>
<tr>
<td>2012</td>
<td>5.40%</td>
<td>4.50%</td>
<td>11.50%</td>
<td>21.46%</td>
</tr>
</tbody>
</table>

The table contains the ratios that were calculated to understand the financial performance of Umniah during the entire study period. The following is an explanation of the behaviour of these ratios before and after using LRIC Model.

Figure 31: Financial Performance Ratios for the study period - Umniah

* Source: Author’s own figure.
Figure 31 shows the behaviour of financial performance ratios for Umniah before using the LRIC model, and it is clear that the ROE ratio was fairly stable, however, all other financial performance ratios, before using the (LRIC) model, ROA, ROS and GPM from 2006-2008 were volatile.

This figure also shows the behaviour of financial performance ratios for Umniah after using the LRIC model. It is clear from this figure that GPM and ROE ratios dropped from 2010-2012, but the changes in the financial performance ratios of ROA and ROS seems to have been stable from 2010-2012, if there is an increase or decrease in these ratios, it was very slight. Thus, the researcher can say that the application of LRIC helps to mitigate volatility in ROS and ROA ratios, but it did not affect the ratio of ROE and GPM.

### 6.1.3 Jordan Mobile Telephone Services Company - Zain

The findings from the analysing of the financial statements and financial reports for Zain for 2006-2012 are shown in table 32. The analysis was completed in terms of Financial Performance specifically:

- ROE: Return on Equity
- ROA: Return on Assets
- ROS: Return on Sales
- GPM: Gross Profit Margin

The below table has been organised to illustrates the variables of the first sub-model.
Table 9: Financial Performance 2006-2012 - Zain

<table>
<thead>
<tr>
<th>Year</th>
<th>ROE</th>
<th>ROA</th>
<th>ROS</th>
<th>GPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>18.70%</td>
<td>18.60%</td>
<td>26.24%</td>
<td>74%</td>
</tr>
<tr>
<td>2007</td>
<td>17.40%</td>
<td>17.21%</td>
<td>17.40%</td>
<td>75%</td>
</tr>
<tr>
<td>2008</td>
<td>18.30%</td>
<td>19.04%</td>
<td>26.40%</td>
<td>71%</td>
</tr>
<tr>
<td>2009</td>
<td>19.20%</td>
<td>20.48%</td>
<td>27.70%</td>
<td>75%</td>
</tr>
<tr>
<td>2010</td>
<td>18.50%</td>
<td>18.40%</td>
<td>27.90%</td>
<td>70.80%</td>
</tr>
<tr>
<td>2011</td>
<td>16.10%</td>
<td>18.28%</td>
<td>25.90%</td>
<td>72.70%</td>
</tr>
<tr>
<td>2012</td>
<td>18.70%</td>
<td>19.80%</td>
<td>23.77%</td>
<td>72.50%</td>
</tr>
</tbody>
</table>

The table contains the ratios that were calculated to understand the financial performance of Zain during the study period. The figure presents an explanation of behaviour of these ratios before and after applying the LRIC Model.

Figure 32: Financial Performance Ratios for the study period - Zain

* Source: Author’s own figure.

It is clear from the figure that the GPM, ROA and ROE ratios were stable from 2006-2008, but the ROS ratio had volatility in the same period, but it was only very slight.

This figure also shows the behaviour of financial performance ratios of Zain after introducing the LRIC model, and it is clear that all financial performance ratios, i.e. ROA, ROE, ROS and GPM seem to have been stable over 2010-2012, and any
movement in these ratios was very slight. As such, it can be concluded that the application of LRIC helps in mitigating volatility in financial performance ratios.

6.2 Cross Sectional Analysis

Data was collected for the period 2006-2012 and addresses the first sub-model, a summary of which is illustrated in table 10. The table illustrates the ROE ratios calculated for Orange, Umniah and Zain during the entire study period. The figure 33 presents an explanation of the behaviour of these ratios before and after application of the LRIC Model.

Table 10: Financial Performance 2006-2012 ROE

<table>
<thead>
<tr>
<th>Y\Fs</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>21.70%</td>
<td>27.45%</td>
<td>18.70%</td>
</tr>
<tr>
<td>2007</td>
<td>22.90%</td>
<td>24.50%</td>
<td>17.40%</td>
</tr>
<tr>
<td>2008</td>
<td>24.10%</td>
<td>23.16%</td>
<td>18.30%</td>
</tr>
<tr>
<td>2009</td>
<td>23.90%</td>
<td>21.42%</td>
<td>19.20%</td>
</tr>
<tr>
<td>2010</td>
<td>22.90%</td>
<td>17.44%</td>
<td>18.50%</td>
</tr>
<tr>
<td>2011</td>
<td>22.10%</td>
<td>16%</td>
<td>16.10%</td>
</tr>
<tr>
<td>2012</td>
<td>20.80%</td>
<td>5.40%</td>
<td>18.70%</td>
</tr>
</tbody>
</table>
Figure 33: Financial Performance 2006-2012 - ROE

* Source: Author’s own figure.

Figure 33 illustrates the behaviour of ROE ratios for each of Orange, Umniah and Zain before using the LRIC model. It was noted that there is a decrease in ROE for Umniah in the period 2006-2008, but there is a slight increase in ROE for Orange for the same period, and for the Zain the ROE ratio seems to be a stable.

This figure also presents the behaviour of ROE ratios for each of Orange, Umniah and Zain after using the LRIC model. It is clear that there is an increase in ROE for Zain and a slight decrease for Orange, but there is a noticeable decrease in the ROE ratio for Umniah for the period 2011-2012. The decrease of Umniah’s ROE in these periods was more than the decrease which occurred before using the LRIC model.
6.2.1 Return On Assets

Table 11: Financial Performance 2006-2012 - ROA

<table>
<thead>
<tr>
<th>Years</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>14.50%</td>
<td>27.55%</td>
<td>18.60%</td>
</tr>
<tr>
<td>2007</td>
<td>14.10%</td>
<td>14.17%</td>
<td>17.21%</td>
</tr>
<tr>
<td>2008</td>
<td>14.70%</td>
<td>14.98%</td>
<td>19.04%</td>
</tr>
<tr>
<td>2009</td>
<td>15.30%</td>
<td>16%</td>
<td>20.48%</td>
</tr>
<tr>
<td>2010</td>
<td>14.10%</td>
<td>5.30%</td>
<td>18.40%</td>
</tr>
<tr>
<td>2011</td>
<td>13.60%</td>
<td>6.40%</td>
<td>18.28%</td>
</tr>
<tr>
<td>2012</td>
<td>12.70%</td>
<td>4.50%</td>
<td>19.80%</td>
</tr>
</tbody>
</table>

The table indicates the ROA ratio calculated for Orange, Umniah and Zain during the entire study period. The figure 34 helps illustrate the behaviour of these ratios before and after using the LRIC Model.
Figure 34: Financial Performance 2006-2012 (Ex Ante) ROA

*Source: Author’s own figure.

Figure 34 illustrates the behaviour of ROA ratios for Orange, Umniah and Zain before using the LRIC model. According to the figure, there is a noticeable decrease in the ROA ratio of Umniah for the period 2006-2007, but it tends to be stable for the period 2007-2008. The ROA ratios of the other two companies indicate a stable behaviour for the years 2006 to 2008.

This figure also shows the behaviour of ROA ratios for the companies after using the LRIC model. As per the figure, there is an increase in this ratio for Zain and a slight decrease in Orange’s ROA ratio, but there is volatility in the ROA ratio for Umniah for the period 2010-2012.
6.2.2 Return on Sales

Table 12: Financial Performance 2006-2012 ROS

<table>
<thead>
<tr>
<th>Y\Fs</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>37.10%</td>
<td>38.46%</td>
<td>26.24%</td>
</tr>
<tr>
<td>2007</td>
<td>23.54%</td>
<td>43.50%</td>
<td>17.40%</td>
</tr>
<tr>
<td>2008</td>
<td>25%</td>
<td>29.15%</td>
<td>26.40%</td>
</tr>
<tr>
<td>2009</td>
<td>25.90%</td>
<td>31.20%</td>
<td>27.70%</td>
</tr>
<tr>
<td>2010</td>
<td>25.80%</td>
<td>13.10%</td>
<td>27.90%</td>
</tr>
<tr>
<td>2011</td>
<td>28.70%</td>
<td>15.20%</td>
<td>25.90%</td>
</tr>
<tr>
<td>2012</td>
<td>27.20%</td>
<td>11.50%</td>
<td>23.77%</td>
</tr>
</tbody>
</table>

The table 12 contains the ROS ratio calculated for Orange, Umniah and Zain during the entire study period. The figure 35 demonstrates the behaviour of these ratios before and after applying the LRIC Model.
Figure 35 shows the behaviour of ROS ratios for Orange, Umniah and Zain before using the LRIC model. These lines are noticeable and illustrate what happened after applying the LRIC model, as there is high volatility between companies through the years 2006-2008. It is clear that the ROS ratio for Umniah had a 5% increase followed by a 15% decrease, and vice versa for the other companies for the same period.

This figure also shows the behaviour of ROS ratios for Orange, Umniah and Zain after using the LRIC model. Zain had a clear decrease of this ratio between 2010-2012, but for the other companies in the same period, the ROS ratio had volatility ranging from 2%-3%. This does not explain what happened in Umniah.
6.2.3 Gross Profit Margin

Table 13: Financial Performance 2006-2012 GPM

<table>
<thead>
<tr>
<th>Y\Fs</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>66.03%</td>
<td>35.89%</td>
<td>74%</td>
</tr>
<tr>
<td>2007</td>
<td>32.82%</td>
<td>37.40%</td>
<td>75%</td>
</tr>
<tr>
<td>2008</td>
<td>34.13%</td>
<td>32.73%</td>
<td>71%</td>
</tr>
<tr>
<td>2009</td>
<td>33.44%</td>
<td>31.90%</td>
<td>75%</td>
</tr>
<tr>
<td>2010</td>
<td>33.33%</td>
<td>35%</td>
<td>70.80%</td>
</tr>
<tr>
<td>2011</td>
<td>21.80%</td>
<td>30.10%</td>
<td>72.70%</td>
</tr>
<tr>
<td>2012</td>
<td>20.40%</td>
<td>21.46%</td>
<td>72.50%</td>
</tr>
</tbody>
</table>

The table contains the GPM ratio calculated for Orange, Umniah and Zain during the entire study period. The following is an explanation of the behaviour of these ratios.
Figure 36: Financial Performance 2006-2012 (Ex Ante) GPM

* Source: Author’s own figure.

Figure 36 clarifies the behaviour of GPM ratios of Orange, Umniah and Zain companies before using the LRIC model. According to the figure, there is a noticeable decrease in the GPM ratio of Orange for the years 2006-2007, but it tends to be stable for 2007-2008. The other companies had an almost stable GPM ratio for the years 2006-2008.

The figure also shows the behaviour of GPM ratios of Orange, Umniah and Zain after applying the LRIC model. Zain had the best GPM between 2010-2012; it is more than 70% but the other companies in the same period saw GPM ratio decrease from 4%-6%, and they did not register more than 40% for this ratio. The graph shows that the only company that continued to decrease was Orange.

6.3 The Second Sub-model (Operational Performance)

This section contains the Behaviour of Operational Performance Ratios and time series analysis for the second Sub-Model which is operational performance. This will be in line and consistent with the two basic variables: the order of hypotheses and models, and the division of the study periods. Data collected under period 2006-2012 is used to address the second sub-model.

6.3.1 Jordan Telecom Company-Orange
Based on the information from financial statements and financial reports for the years 2006-2012, the table below has been developed to illustrate operational performances including revenue, EBITDA, net profit and CAPEX.

**Table 14: Operational Performance 2006-2012 - Orange**

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue</th>
<th>EBITDA</th>
<th>Net Profit</th>
<th>CAPEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>392.9</td>
<td>169.1</td>
<td>87</td>
<td>41.7</td>
</tr>
<tr>
<td>2007</td>
<td>397.9</td>
<td>170.6</td>
<td>94.5</td>
<td>43.8</td>
</tr>
<tr>
<td>2008</td>
<td>401.4</td>
<td>178.5</td>
<td>99.33</td>
<td>42.8</td>
</tr>
<tr>
<td>2009</td>
<td>400.1</td>
<td>180.7</td>
<td>103.4</td>
<td>53</td>
</tr>
<tr>
<td>2010</td>
<td>402.1</td>
<td>173.3</td>
<td>94.8</td>
<td>41</td>
</tr>
<tr>
<td>2011</td>
<td>408</td>
<td>155.8</td>
<td>83.2</td>
<td>38</td>
</tr>
<tr>
<td>2012</td>
<td>411</td>
<td>163.1</td>
<td>89.7</td>
<td>36</td>
</tr>
</tbody>
</table>

Table 13 contains the ratios calculated for operational performance indicators for Orange during the entire study period. The following is an explanation of the behaviour of these ratios before and after using the LRIC Model.

**Figure 37: Operational Performance ratios for the period of the study - Orange**

![Figure 37: Operational Performance ratios for the period of the study - Orange](image)

* Source: Author’s own figure.

Figure 37 shows operational performance ratios for Orange before using the LRIC model. According to the figure, it is clear that best ratio, in terms of stability is the Revenue indicators. It is also noted, that all the operational performance ratios for Orange were stable before using LRIC model for the period 2006-2008.
This figure further indicates the operational performance ratios of Orange after using the LRIC model. Again, based on the figure, it is clear that most consistent ratio is the Revenue indicator, and all operational performance ratios for Orange were stable for the period 2010-2012 after the implementation of the LRIC model. This means applying the LRIC model has had no effect on the operational performance ratios of Orange.

### 6.3.2 Umniah Mobile Company-Umniah

**Table 15: Operational Performance 2006-2012 - Umniah**

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue</th>
<th>EBITDA</th>
<th>Net Profit</th>
<th>CAPEX</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M.JD</td>
<td>M.JD</td>
<td>M.JD</td>
<td>M.JD</td>
</tr>
<tr>
<td>2006</td>
<td>234.9</td>
<td>128.2</td>
<td>90.8</td>
<td>32.18</td>
</tr>
<tr>
<td>2007</td>
<td>293.1</td>
<td>126.3</td>
<td>104.1</td>
<td>33.7</td>
</tr>
<tr>
<td>2008</td>
<td>319.1</td>
<td>134.1</td>
<td>107.9</td>
<td>30.7</td>
</tr>
<tr>
<td>2009</td>
<td>346.9</td>
<td>132.3</td>
<td>111.7</td>
<td>34.2</td>
</tr>
<tr>
<td>2010</td>
<td>340.3</td>
<td>130.2</td>
<td>94.2</td>
<td>45.9</td>
</tr>
<tr>
<td>2011</td>
<td>326.9</td>
<td>126</td>
<td>83.85</td>
<td>42.4</td>
</tr>
<tr>
<td>2012</td>
<td>304</td>
<td>101.8</td>
<td>65.34</td>
<td>40.1</td>
</tr>
</tbody>
</table>

The table contains the ratios calculated for operational performance indicators for Umniah during the entire study period. The following is an explanation of the behaviour of these ratios before and after applying the LRIC Model.
Figure 38: Operational Performance for the study period - Umniah

Figure 38 firstly, shows operational performance ratios of Umniah before using the LRIC model. As per the figure, it is clear that best ratio ratios is the Revenue indicator it shows that revenue was increasing before applying the LRIC model, and that the other operational performance ratios of Umniah were stable before using LRIC model for the period 2006-2008.

Moreover, this figure also shows the behaviour of operational performance ratios after using the LRIC model. It can be noted that revenue decreased after introducing the LRIC model, which means that the LRIC model negatively affected the revenue of this company. But all other operational performance ratios were stable after applying the LRIC model for the period 2010-2012.

* Source: Author’s own figure.
6.3.3 Jordan Mobile Telephone Services Company—Zain

Table 16: Operational Performance 2006-2012 - Zain

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue (M.JD)</th>
<th>EBITDA (M.JD)</th>
<th>Net Profit (M.JD)</th>
<th>CAPEX (M.JD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>485.4</td>
<td>253.7</td>
<td>135.1</td>
<td>25.6</td>
</tr>
<tr>
<td>2007</td>
<td>477</td>
<td>220.6</td>
<td>119.2</td>
<td>31.9</td>
</tr>
<tr>
<td>2008</td>
<td>482.2</td>
<td>239.7</td>
<td>134.2</td>
<td>23.5</td>
</tr>
<tr>
<td>2009</td>
<td>480.2</td>
<td>237.7</td>
<td>133.9</td>
<td>20.6</td>
</tr>
<tr>
<td>2010</td>
<td>514.2</td>
<td>228.5</td>
<td>143.9</td>
<td>27.6</td>
</tr>
<tr>
<td>2011</td>
<td>505.8</td>
<td>231.5</td>
<td>131.6</td>
<td>23.8</td>
</tr>
<tr>
<td>2012</td>
<td>509.3</td>
<td>225.7</td>
<td>121.6</td>
<td>31.8</td>
</tr>
</tbody>
</table>

The table includes the ratios calculated for the operational performance indicators of Zain during the entire study period. The following is an illustration of these ratios before and after implementing the LRIC Model.

Figure 39: Operational Performance ratios for the study period - Zain

* Source: Author's own figure.

Figure 39, shows operational performance ratios for Zain before using the LRIC model. Based on this figure it is clear that the highest ratio is the revenue indicator. All the
operational performance ratios for Zain were stable before using the LRIC model for the period 2006-2008.

The behaviour of operational performance ratios after implementing the LRIC model is also shown, the highest ratio is again the revenue indicators, but the operational performance ratios for Zain were stable after using LRIC model-the period 2010-2012.

6.4 Cross Sectional Analysis

Data collected for the period 2006-2012 is used to chart and analyse the second sub-mode.

6.4.1 Revenue Ratio

Table 17: Operational Performance 2006-2012 Revenue

<table>
<thead>
<tr>
<th></th>
<th>OP Revenue (Ex Ante and Ex Post)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Orange M. JD</td>
</tr>
<tr>
<td><strong>Y\Fs</strong></td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>392.9</td>
</tr>
<tr>
<td>2007</td>
<td>397.9</td>
</tr>
<tr>
<td>2008</td>
<td>401.4</td>
</tr>
<tr>
<td>2009</td>
<td>400.1</td>
</tr>
<tr>
<td>2010</td>
<td>402.1</td>
</tr>
<tr>
<td>2011</td>
<td>408</td>
</tr>
<tr>
<td>2012</td>
<td>411</td>
</tr>
</tbody>
</table>

The table explains the revenue calculated to help understand the operational performance of Orange, Umniah and Zain during the entire study period. The following is an explanation of the behaviour of the revenue before and after using the LRIC Model.
Figure 40: Operational Performance 2006-2012 (Ex Ante) – Revenue

* Source: Author’s own figure.

Figure 40 shows the behaviour of Revenue ratios for each of Orange, Umniah and Zain before implementing the LRIC model. It is noted that, as per the figure, Orange and Zain have a more stable flow before applying the LRIC model, but Umniah shows a noticeable increase in revenue between the 2006 and 2007. Also all operational indicators were stable for the period 2007-2008.

With reference to the revenue ratio of Orange, Umniah and Zain after using the LRIC model between the years 2010-2012, it was noticed that the revenue ratios are stable with only very slight changes.

6.4.2 Earnings Before Interest, Tax, Depreciation and Amortisation (EBITDA)
Table 18: Operational Performance 2006-2012 EBITDA

<table>
<thead>
<tr>
<th>Y\Fs</th>
<th>Orange M. JD</th>
<th>Umniah M. JD</th>
<th>Zain M. JD</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>169.1</td>
<td>128.2</td>
<td>253.7</td>
</tr>
<tr>
<td>2007</td>
<td>170.6</td>
<td>126.3</td>
<td>220.6</td>
</tr>
<tr>
<td>2008</td>
<td>178.5</td>
<td>134.1</td>
<td>239.7</td>
</tr>
<tr>
<td>2009</td>
<td>180.7</td>
<td>132.3</td>
<td>237.7</td>
</tr>
<tr>
<td>2010</td>
<td>173.3</td>
<td>130.2</td>
<td>228.5</td>
</tr>
<tr>
<td>2011</td>
<td>155.8</td>
<td>126</td>
<td>231.5</td>
</tr>
<tr>
<td>2012</td>
<td>163.1</td>
<td>101.8</td>
<td>225.7</td>
</tr>
</tbody>
</table>

The table contains the EBITDA Ratio calculated for Orange, Umniah and Zain during the entire study period. Below is a graphic of the behaviour of these ratios before and after employing the LRIC Model.

Figure 41: Operational Performance 2006-2012 (Ex Ante) EBITDA

*Source: Author’s own figure.*
According to the above figure, it is clear that the Zain was more volatile before adopting the LRIC model, but Umnia and Orange had slight increases in the EBITDA between 2007-2008.

This figure also presents the EBITDA ratios for each Orange, Umnia and Zain after using the LRIC model. As per the graph above Orange, had a more volatile EBITDA and Umnia had a clear decrease in 2011-2012, but Zain was stable during the period 2010-2012.

6.4.3 Net Profit Ratio

Table 19: Operational Performance 2006-2012 Net Profit

<table>
<thead>
<tr>
<th>Years</th>
<th>Orange M. JD</th>
<th>Umnia M. JD</th>
<th>Zain M. JD</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>87</td>
<td>90.8</td>
<td>135.1</td>
</tr>
<tr>
<td>2007</td>
<td>94.5</td>
<td>104.1</td>
<td>119.2</td>
</tr>
<tr>
<td>2008</td>
<td>99.33</td>
<td>107.9</td>
<td>134.2</td>
</tr>
<tr>
<td>2009</td>
<td>103.4</td>
<td>111.7</td>
<td>133.9</td>
</tr>
<tr>
<td>2010</td>
<td>94.8</td>
<td>94.2</td>
<td>143.9</td>
</tr>
<tr>
<td>2011</td>
<td>83.2</td>
<td>83.85</td>
<td>131.6</td>
</tr>
<tr>
<td>2012</td>
<td>89.7</td>
<td>65.34</td>
<td>121.6</td>
</tr>
</tbody>
</table>

The table contains the net profit Ratio that was calculated to understand the operational performances of Orange, Umnia and Zain during the full study period. The following is an explanation of the behaviour of these ratios before and after implementing the LRIC Model.
Figure 42: Operational Performance 2006-2012 (Ex Ante) Net Profit

*Source: Author’s own figure.

Figure 42 firstly, shows the net profit ratios for each Orange, Umniah and Zain before using the LRIC model, the figure shows that the figures for Zain were more volatile before introducing the LRIC model, but Umniah and Orange had slight increases between 2006-2008.

On the other hand, the net profit ratios for each Orange, Umniah and Zain after using the LRIC show that Zain and Umniah had sharp decreases in the net profit ratio between the years 2010-2012, but Orange showed an increase in net profit from 2011.

6.4.4 Capital Expenditures Ratio-CAPEX

Table 20: Operational Performance 2006-2012 CAPEX

<table>
<thead>
<tr>
<th>Year</th>
<th>Orange M. JD</th>
<th>Umniah M. JD</th>
<th>Zain M. JD</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>87</td>
<td>90.8</td>
<td>135.1</td>
</tr>
<tr>
<td>2007</td>
<td>94.5</td>
<td>104.1</td>
<td>119.2</td>
</tr>
<tr>
<td>2008</td>
<td>99.33</td>
<td>107.9</td>
<td>134.2</td>
</tr>
</tbody>
</table>
The table explains the CAPEX Ratio calculated for operational performance indicators of Orange, Umniah and Zain during the study period. The following is an illustration of these ratios before and after using LRIC Model.

**Figure 43: Operational Performance 2006-2012 (Ex Ante) CAPEX**

As per figure 43, it was noted that Zain’s CAPEX was volatile before using the LRIC model, but Umniah and Orange had only slight volatilities in their CAPEX between 2006-2008. Further, it is also clear that the behaviour of the CAPEX of Zain was volatile after the introduction of the LRIC model between 2010-2012. Moreover, Orange and Umniah showed decreases of their CAPEX ratios during 2011 and 2012.

<table>
<thead>
<tr>
<th>Year</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>103.4</td>
<td>111.7</td>
<td>133.9</td>
</tr>
<tr>
<td>2010</td>
<td>94.8</td>
<td>94.2</td>
<td>143.9</td>
</tr>
<tr>
<td>2011</td>
<td>83.2</td>
<td>83.85</td>
<td>131.6</td>
</tr>
<tr>
<td>2012</td>
<td>89.7</td>
<td>65.34</td>
<td>121.6</td>
</tr>
</tbody>
</table>

* Source: prepared the author.
6.5 The Third Sub-model (Competitive Performance)

This section of the study displays the collected data to evaluate the competitive performance of three companies and answers the third sub-model and the related hypotheses under the third sub model.

6.5.1 Jordan Telecom Company-Orange

Based on the financial statements of Orange the researcher has organised the tables below to present indicators of competitive performances such as customers, market share and service costs for the period 2006 to 2012. This analysis serves to address the third sub-model of this study in order to judge the competitive performances of the company.

Table 21: Competitive Performance 2006-2012 - Orange

<table>
<thead>
<tr>
<th>Year</th>
<th>Customers</th>
<th>Market (Mobile)</th>
<th>Share</th>
<th>Service Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>1110</td>
<td></td>
<td>30%</td>
<td>123.3</td>
</tr>
<tr>
<td>2007</td>
<td>1456</td>
<td></td>
<td>33.70%</td>
<td>161.3</td>
</tr>
<tr>
<td>2008</td>
<td>2552</td>
<td></td>
<td>46.80%</td>
<td>223.7</td>
</tr>
<tr>
<td>2009</td>
<td>1525</td>
<td></td>
<td>29%</td>
<td>133.7</td>
</tr>
<tr>
<td>2010</td>
<td>1928</td>
<td></td>
<td>31%</td>
<td>146.3</td>
</tr>
<tr>
<td>2011</td>
<td>2677</td>
<td></td>
<td>36%</td>
<td>209.5</td>
</tr>
<tr>
<td>2012</td>
<td>3397</td>
<td></td>
<td>37%</td>
<td>257.2</td>
</tr>
</tbody>
</table>

The above table presents the indicators used to measure the competitive performance including customers, market share and service cost of the Orange Company. Based on the table, the figure 44 was derived to reflect the behaviour of each indicator of competition before and after using the LRIC Model.
As reflected by the figure (44), before implementing the LRIC model the customer base of the company increased gradually. The market share and the service costs indicators also increased during the period 2006-2008.

Moreover, with reference to the competitive behaviour of the company after the LRIC implementation, it was noticed that the customer base saw a sudden drop in 2009 and started to increase from 2010. The market share and the service cost of the company also decreased in the same period and then started to increase in the following years.

**6.5.2 Umniah Mobile Company-Umniah**

**Table 22: Competitive Performance 2006-2012 Umniah**

<table>
<thead>
<tr>
<th>Year (Y)</th>
<th>Customers</th>
<th>Market Share (Mobile)</th>
<th>Service Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>929</td>
<td>17%</td>
<td>101.4</td>
</tr>
<tr>
<td>2007</td>
<td>1044</td>
<td>23.30%</td>
<td>102.6</td>
</tr>
<tr>
<td>2008</td>
<td>979</td>
<td>10.10%</td>
<td>103.3</td>
</tr>
<tr>
<td>2009</td>
<td>1952</td>
<td>27%</td>
<td>126.3</td>
</tr>
<tr>
<td>2010</td>
<td>2815</td>
<td>29%</td>
<td>181.5</td>
</tr>
<tr>
<td>2011</td>
<td>2621</td>
<td>27%</td>
<td>169.6</td>
</tr>
<tr>
<td>2012</td>
<td>2427</td>
<td>25%</td>
<td>113.4</td>
</tr>
</tbody>
</table>

The above table presents the indicators of the competitive performance of Umniah. Based on these statistics, the figure was prepared to help explain the behaviours of these indicators before and after using LRIC Model.
As presented in the figure 45, the customer base of the company shows volatility during 2006-2008 before implementing the LRIC model. Market share also reflects volatility in behaviour whereas service cost of the company shows some increments during 2006-2008.

In the time period of 2009-2010; the time after implementing the LRIC model, there is a noticeable increase in the customer base market share and service cost in 2009-2011, but again the customer numbers, market share and the service cost decreased in 2012.

### 6.5.3 Jordan Mobile Telephone Services Company-Zain

#### Table 23: Competitive Performance 2006-2012 - Zain

<table>
<thead>
<tr>
<th>Year</th>
<th>Customers</th>
<th>Market Share (Mobile)</th>
<th>Service Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>1961</td>
<td>53%</td>
<td>113.9</td>
</tr>
<tr>
<td>2007</td>
<td>1858</td>
<td>43%</td>
<td>108.5</td>
</tr>
<tr>
<td>2008</td>
<td>2345</td>
<td>43%</td>
<td>137.4</td>
</tr>
<tr>
<td>2009</td>
<td>2261</td>
<td>43%</td>
<td>120.1</td>
</tr>
<tr>
<td>2010</td>
<td>2488</td>
<td>40%</td>
<td>150.2</td>
</tr>
<tr>
<td>2011</td>
<td>2751</td>
<td>37%</td>
<td>141.7</td>
</tr>
<tr>
<td>2012</td>
<td>3489</td>
<td>38%</td>
<td>140.2</td>
</tr>
</tbody>
</table>

The above table reflects the customer base, market share and service costs that is used to analyse the competitive performance of Zain before and after using the LRIC model.
**Figure 46: Competitive Performance Ratios for the study period - Zain**

In the figure (46), the time period between 2006-2008 reflects the time before using the LRIC model. Based on the figure, it was observed that the customer base of the company decreased from 2006 to 2007. It was also observed that the customer base increased from 2007 to 2008, but the market share was stable. Service cost also increased during this time.

This figure also shows the behaviour of the competitive performance of Zain after implementing the LRIC model. It is clear from this figure that the customers base decreased slightly in 2009 and then started to increase from 2010-2012. Market share in 2009 was the same as the previous year, but the service cost decreased slightly. It is also noted that the market share decreased gradually from 2009 to 2011 and then started to increase in 2012. Further the service cost of the company had a huge increment in 2010 compared to previous years and then again started to decrease in the years 2011 and 2012.

**6.6 Cross Sectional Analysis**

Data collected for the period 2006-2012 is used for the purposes of analysing the third sub-model.
6.6.1 Customers Ratio

Table 24: Competitive Performance 2006-2012 - Customers

<table>
<thead>
<tr>
<th>Y/Ys</th>
<th>Orange 1000’s</th>
<th>Umniah 1000’s</th>
<th>Zain 1000’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>1110</td>
<td>929</td>
<td>1961</td>
</tr>
<tr>
<td>2007</td>
<td>1456</td>
<td>1044</td>
<td>1858</td>
</tr>
<tr>
<td>2008</td>
<td>2552</td>
<td>979</td>
<td>2345</td>
</tr>
<tr>
<td>2009</td>
<td>1525</td>
<td>1952</td>
<td>2261</td>
</tr>
<tr>
<td>2010</td>
<td>1928</td>
<td>2815</td>
<td>2488</td>
</tr>
<tr>
<td>2011</td>
<td>2677</td>
<td>2621</td>
<td>2751</td>
</tr>
<tr>
<td>2012</td>
<td>3397</td>
<td>2427</td>
<td>3489</td>
</tr>
</tbody>
</table>

The table contains customers Ratio which was calculated for indicators of competitive performance for Orange, Umniah and Zain during the entire study period, the following is an explanation of the behaviour of these ratios before and after applying the LRIC model.

The above table presents the customer base of all three companies before and after using LRIC model. Based on this table, the figure was prepared to help compare the customer bases of each Orange, Umniah and Zain.
Figure 47: Competitive Performance 2006-2012 (Ex Ante) Customers

* Source: Author’s own figure.

According to the above, before using the LRIC model, there is a noticeable increase in the customer base of Orange for the years 2006-2008. Umniah had volatility in their customer base rising in 2007 and falling in 2008. Zain showed a decrease in customer base in 2007 and again an increase in 2008 which can be argued as volatility in the customer base.

Moreover, this figure also reflects the behaviour of the customer base of each company after the implementation of LRIC model, there is some increase in the customer base for Orange and Zain in the period 2010-2012 after a sudden decrease in 2009. Interestingly, in contrast to Orange and Zain, the customer base of Umniah increased in 2009 and 2010 and then started to decrease in 2011 and 2012.
6.6.2 Market Share Ratio:

Table 25: Competitive Performance 2006-2012 - Market Share

<table>
<thead>
<tr>
<th>Y\Fs</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>30%</td>
<td>17%</td>
<td>53%</td>
</tr>
<tr>
<td>2007</td>
<td>33.70%</td>
<td>23.30%</td>
<td>43%</td>
</tr>
<tr>
<td>2008</td>
<td>46.80%</td>
<td>10.10%</td>
<td>43%</td>
</tr>
<tr>
<td>2009</td>
<td>29%</td>
<td>27%</td>
<td>43%</td>
</tr>
<tr>
<td>2010</td>
<td>31%</td>
<td>29%</td>
<td>40%</td>
</tr>
<tr>
<td>2011</td>
<td>36%</td>
<td>27%</td>
<td>37%</td>
</tr>
<tr>
<td>2012</td>
<td>37%</td>
<td>25%</td>
<td>38%</td>
</tr>
</tbody>
</table>

The above table indicates the market share which is the second indicator used to measure competitive performance of each Orange, Umniah and Zain. This data is used to prepare the figure which further illustrates the market share of the three companies before and after using the LRIC model.

Figure 48: Competitive Performance 2006-2012 (Ex Ante) Market share

As per the above figure, it is clear that the market share for Orange increased during 2006-2008 prior to the LRIC implementation. The situation differed with Umniah and...
Zain, where Umniah’s market share increased in 2007 and then decreased in 2008. While
Zain’s market share decreased over 2007-2008.

This figure also shows the behaviour of market share for Orange, Umniah and Zain after
using the LRIC model. A decrease in market share of Orange in 2009 can be noted and
then an increase in 2010-2012. With reference to Umniah’s market share, there was a
sudden increase in 2009 followed by a decrease in 2010-2012. Zain’s market share
decreased continuously from 2009-2012.

6.6.3 Service Cost Ratio:

Table 26: Competitive Performance 2006-2012 - Service Cost

<table>
<thead>
<tr>
<th>Year</th>
<th>Orange MJDs</th>
<th>Umniah MJDs</th>
<th>Zain MJDs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>123.3</td>
<td>101.4</td>
<td>113.9</td>
</tr>
<tr>
<td>2007</td>
<td>161.3</td>
<td>102.6</td>
<td>108.5</td>
</tr>
<tr>
<td>2008</td>
<td>223.7</td>
<td>103.3</td>
<td>137.4</td>
</tr>
<tr>
<td>2009</td>
<td>133.7</td>
<td>126.3</td>
<td>120.1</td>
</tr>
<tr>
<td>2010</td>
<td>146.3</td>
<td>181.5</td>
<td>150.2</td>
</tr>
<tr>
<td>2011</td>
<td>209.5</td>
<td>169.6</td>
<td>141.7</td>
</tr>
<tr>
<td>2012</td>
<td>257.2</td>
<td>113.4</td>
<td>140.2</td>
</tr>
</tbody>
</table>

Table 26 presents the service cost of all three companies for the period 2006-2012.
The figure further illustrates the service cost fluctuations before and after LRIC
implementation.

Figure 49: Competitive Performance 2006-2012 (Ex Ante) Service Cost

* Source: Author’s own figure.
As per figure 49, before using the LRIC model, service cost for Orange were continuously increasing until 2008, whereas the service cost of Umniah reflected a more stable behaviour compared to Orange. Zain’s service cost increased in 2008 compared to the previous years of 2006 and 2007.

The figure also presents the service cost fluctuations after implementing the LRIC model during the period 2009-2012. It was noted that there is a noticeable decrease in the service cost for Orange in 2009 and then an increase in the service cost continuously until 2012. With regards to Umniah, the service cost increased until 2010 and then started to decrease from 2010-2012. But for Zain there was a decrease in the service cost in 2009 and an increase in 2010.

6.7 Data Analysis

According to the 1st Hypothesis which stipulates that:

\[ H_{1a} \]: The application of LRIC models has had a significant impact on the financial performance variables of Orange, Umniah and Zain in the JTI as measured by (ROE, ROA, ROS and GPM).

The researcher tries to show the accumulated Financial Performance’s Variable in the Tables below for the ROE, ROA, ROS, and GPM and calculate the Arithmetic mean for every variable before and after applying the LRIC – which means: arithmetic mean for the period 2006-2008 and arithmetic mean for the period 2010-2012 for every variable from the financial performance indices - the researcher can, thereby, judge the effects of the application of the LRIC model in the sample of this study.

Note: the researcher left the year of 2009 as a neutral year because the JTI start to apply LRIC in this year.
Table 27: The Accumulated Variable ROE

<table>
<thead>
<tr>
<th>ROE</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>21.7%</td>
<td>27.45%</td>
<td>18.7%</td>
</tr>
<tr>
<td>2007</td>
<td>22.9%</td>
<td>24.5%</td>
<td>17.4%</td>
</tr>
<tr>
<td>2008</td>
<td>24.1%</td>
<td>23.16%</td>
<td>18.3%</td>
</tr>
<tr>
<td></td>
<td>22.9%</td>
<td>25.04%</td>
<td>18.13%</td>
</tr>
<tr>
<td>2009</td>
<td>23.9%</td>
<td>21.42%</td>
<td>19.2%</td>
</tr>
<tr>
<td>2010</td>
<td>22.9%</td>
<td>17.44%</td>
<td>18.5%</td>
</tr>
<tr>
<td>2011</td>
<td>22.1%</td>
<td>16%</td>
<td>16.1%</td>
</tr>
<tr>
<td>2012</td>
<td>20.8%</td>
<td>5.4%</td>
<td>18.7%</td>
</tr>
<tr>
<td></td>
<td>21.93%</td>
<td>12.95%</td>
<td>17.77%</td>
</tr>
</tbody>
</table>

* Source: Author’s own figure.

After calculating, the arithmetic mean for the ROE for the three years before applying the LRIC and for three years after applying LRIC researcher found that.

Table 28: The Result of Applying LRIC in JTI using ROE Ratio

<table>
<thead>
<tr>
<th>ROE</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arithmetic mean (Before)</td>
<td>22.9%</td>
<td>25.04%</td>
<td>18.13%</td>
</tr>
<tr>
<td>Arithmetic mean (After)</td>
<td>21.93%</td>
<td>12.95%</td>
<td>17.77%</td>
</tr>
<tr>
<td>Differences</td>
<td>0.97% -</td>
<td>12.09% -</td>
<td>0.36% -</td>
</tr>
<tr>
<td>Result</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

Table 29: the Accumulated Variable (ROA)

<table>
<thead>
<tr>
<th>ROA</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>14.5%</td>
<td>27.55%</td>
<td>18.6%</td>
</tr>
<tr>
<td>2007</td>
<td>14.1%</td>
<td>14.17%</td>
<td>17.21%</td>
</tr>
<tr>
<td>2008</td>
<td>14.7%</td>
<td>14.98%</td>
<td>19.04%</td>
</tr>
<tr>
<td></td>
<td>14.43%</td>
<td>18.9%</td>
<td>18.9%</td>
</tr>
<tr>
<td>2009</td>
<td>15.03%</td>
<td>16%</td>
<td>20.48%</td>
</tr>
<tr>
<td>2010</td>
<td>14.1%</td>
<td>5.3%</td>
<td>18.4%</td>
</tr>
</tbody>
</table>
**DATA COLLECTION AND ANALYSIS**

<table>
<thead>
<tr>
<th>Year</th>
<th>ROA 1</th>
<th>ROA 2</th>
<th>ROA 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>13.6%</td>
<td>6.4%</td>
<td>18.28%</td>
</tr>
<tr>
<td>2012</td>
<td>12.7%</td>
<td>4.5%</td>
<td>19.8%</td>
</tr>
<tr>
<td><strong>Arithmetic mean</strong></td>
<td><strong>13.47%</strong></td>
<td><strong>5.4%</strong></td>
<td><strong>18.83%</strong></td>
</tr>
</tbody>
</table>

*Source: Author’s own table.*

After calculate arithmetic mean for the ROA for the three years before applying LRIC and for three years after applying LRIC researcher found that:

**Table 30: The result of Applying LRIC in JTI using ROA Ratio**

<table>
<thead>
<tr>
<th>ROA</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Arithmetic mean (Before)</strong></td>
<td>14.43%</td>
<td>18.9%</td>
<td>18.9%</td>
</tr>
<tr>
<td><strong>Arithmetic mean (After)</strong></td>
<td>13.47%</td>
<td>5.4%</td>
<td>18.83%</td>
</tr>
<tr>
<td><strong>Differences</strong></td>
<td>0.96% -</td>
<td>13.50% -</td>
<td>0.07% -</td>
</tr>
<tr>
<td><strong>Result</strong></td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
</tr>
</tbody>
</table>

*Source: Author’s own table.*

**Table 31: The Accumulated Variable (ROS)**

<table>
<thead>
<tr>
<th>ROA</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2006</strong></td>
<td>37.1%</td>
<td>38.46%</td>
<td>26.24%</td>
</tr>
<tr>
<td><strong>2007</strong></td>
<td>23.54%</td>
<td>43.5%</td>
<td>17.4%</td>
</tr>
<tr>
<td><strong>2008</strong></td>
<td>25%</td>
<td>29.15%</td>
<td>26.4%</td>
</tr>
<tr>
<td><strong>Arithmetic mean</strong></td>
<td>28.55%</td>
<td>37.04%</td>
<td>23.35%</td>
</tr>
<tr>
<td><strong>2009</strong></td>
<td>25.9%</td>
<td>31.2%</td>
<td>27.7%</td>
</tr>
<tr>
<td><strong>2010</strong></td>
<td>25.8%</td>
<td>13.1%</td>
<td>27.9%</td>
</tr>
<tr>
<td><strong>2011</strong></td>
<td>28.7%</td>
<td>15.2%</td>
<td>25.9%</td>
</tr>
<tr>
<td><strong>2012</strong></td>
<td>27.2%</td>
<td>11.5%</td>
<td>23.77%</td>
</tr>
<tr>
<td><strong>Arithmetic mean</strong></td>
<td>27.23%</td>
<td>13.27%</td>
<td>25.86%</td>
</tr>
</tbody>
</table>

*Source: Author’s own table.*

After calculating arithmetic mean for the ROS for the three years before applying LRIC and for three years after applying LRIC researcher found that:
Table 32: The result of Applying LRIC in JTI using ROS Ratio

<table>
<thead>
<tr>
<th>ROS</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arithmetic mean (Before)</td>
<td>28.55%</td>
<td>37.04%</td>
<td>23.35%</td>
</tr>
<tr>
<td>Arithmetic mean (After)</td>
<td>27.23%</td>
<td>13.27%</td>
<td>25.86%</td>
</tr>
<tr>
<td>Differences</td>
<td>1.32%</td>
<td>23.77%</td>
<td>+2.51%</td>
</tr>
<tr>
<td>Result</td>
<td>Negative</td>
<td>Negative</td>
<td>Positive</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

Table 33: Accumulated Variable (GPM)

<table>
<thead>
<tr>
<th>GPM</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>66.03%</td>
<td>35.89%</td>
<td>74%</td>
</tr>
<tr>
<td>2007</td>
<td>32.82%</td>
<td>37.4%</td>
<td>75%</td>
</tr>
<tr>
<td>2008</td>
<td>34.13%</td>
<td>32.73%</td>
<td>71%</td>
</tr>
<tr>
<td>Arithmetic mean</td>
<td>44.33%</td>
<td>35.34%</td>
<td>73.33%</td>
</tr>
<tr>
<td>2009</td>
<td>33.44%</td>
<td>31.9%</td>
<td>75%</td>
</tr>
<tr>
<td>2010</td>
<td>33.33%</td>
<td>35%</td>
<td>70.8%</td>
</tr>
<tr>
<td>2011</td>
<td>21.8%</td>
<td>30.1%</td>
<td>72.7%</td>
</tr>
<tr>
<td>2012</td>
<td>20.4%</td>
<td>21.46%</td>
<td>72.5%</td>
</tr>
<tr>
<td>Arithmetic mean</td>
<td>25.18%</td>
<td>28.85%</td>
<td>72%</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

Result: after calculate arithmetic mean for the GPM for the three years before applying LRIC and for three years after applying LRIC researcher found that:

Table 34: The Result of applying LRIC in JTI using GPM Ratio

<table>
<thead>
<tr>
<th>GPM</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arithmetic mean (Before)</td>
<td>44.33%</td>
<td>35.34%</td>
<td>73.33%</td>
</tr>
<tr>
<td>Arithmetic mean (After)</td>
<td>25.18%</td>
<td>28.85%</td>
<td>72%</td>
</tr>
<tr>
<td>Differences</td>
<td>19.15%</td>
<td>6.49%</td>
<td>1.33%</td>
</tr>
<tr>
<td>Result</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

6.7.1 Testing 1st Hypothesis:
H$_{1a}$: The application of LRIC models has had a significant impact on the financial performance variables of Orange, Umniah and Zain in the JTI as measured by (ROE, ROA, ROS and GPM).

The Table below shows the results of the application of LRIC Model and its impact on the Financial Performance:

**Table 35: Result of Test - First Sub-Hypothesis**

<table>
<thead>
<tr>
<th>Financial Performance</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROE</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
</tr>
<tr>
<td>ROA</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
</tr>
<tr>
<td>ROS</td>
<td>Negative</td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td>GPM</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

In General, there is a negative relationship between the application of LRIC models on the Jordanian Telecommunications Companies and their Financial Performance.
6.7.2 The 2\textsuperscript{nd} hypothesis

According to the 2\textsuperscript{nd} hypothesis which stipulates that:

\textbf{H\textsubscript{1b}}: The application of LRIC models has had a significant impact on the operational performance variables of Orange, Umniah and Zain in the JTI as measured by (Revenues, EBITDA, Net Profit and Capex).

The researcher tries to show accumulated Operational Performance’s Variable in the Tables below for the Revenue, EBITDA, Net Profit, and CAPEX and calculate the arithmetic mean for every variable before applying LRIC and after applying LRIC - which means: arithmetic mean for the period 2006-2008 and Arithmetic mean for the period 2010-2012. Thereby, the researcher can judge the impact of the application of the LRIC model in the sample of this study.

Note: the researcher left the year of 2009 as a neutral year because the JTI started to apply LRIC in this year.

\textbf{Table 36: The Accumulated Variable (Revenue)}

<table>
<thead>
<tr>
<th>Revenue</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>392.9</td>
<td>234.9</td>
<td>485.4</td>
</tr>
<tr>
<td>2007</td>
<td>397.9</td>
<td>293.1</td>
<td>477</td>
</tr>
<tr>
<td>2008</td>
<td>401.4</td>
<td>319.07</td>
<td>482.2</td>
</tr>
<tr>
<td>Arithmetic mean</td>
<td>397.4</td>
<td>282.4</td>
<td>481.5</td>
</tr>
<tr>
<td>2009</td>
<td>400.1</td>
<td>346.9</td>
<td>480.2</td>
</tr>
<tr>
<td>2010</td>
<td>402.1</td>
<td>340.25</td>
<td>514.2</td>
</tr>
<tr>
<td>2011</td>
<td>408</td>
<td>326.9</td>
<td>505.8</td>
</tr>
<tr>
<td>2012</td>
<td>411</td>
<td>304</td>
<td>509.3</td>
</tr>
<tr>
<td>Arithmetic mean</td>
<td>407</td>
<td>323.7</td>
<td>509.8</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

After calculating the arithmetic mean for the revenue for the three years before applying LRIC and for three years after applying LRIC, the researcher found that:
Table 37: The result of Applying LRIC In JTI - Revenue Ratio

<table>
<thead>
<tr>
<th>Revenue</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arithmetic mean (Before)</td>
<td>397.4</td>
<td>282.4</td>
<td>481.5</td>
</tr>
<tr>
<td>Arithmetic mean (After)</td>
<td>407</td>
<td>323.7</td>
<td>509.8</td>
</tr>
<tr>
<td>Differences</td>
<td>9.60 +</td>
<td>41.30 +</td>
<td>28.30 +</td>
</tr>
<tr>
<td>Result</td>
<td>Positive</td>
<td>Positive</td>
<td>Positive</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

Table 38: The Accumulated Variable (EBITDA)

<table>
<thead>
<tr>
<th>EBITDA</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>169.1</td>
<td>128.2</td>
<td>253.7</td>
</tr>
<tr>
<td>2007</td>
<td>170.6</td>
<td>126.3</td>
<td>220.6</td>
</tr>
<tr>
<td>2008</td>
<td>178.5</td>
<td>134.1</td>
<td>239.7</td>
</tr>
<tr>
<td>Arithmetic mean</td>
<td>172.7</td>
<td>129.5</td>
<td>238</td>
</tr>
<tr>
<td>2009</td>
<td>180.7</td>
<td>132.3</td>
<td>237.7</td>
</tr>
<tr>
<td>2010</td>
<td>173.3</td>
<td>130.2</td>
<td>228.5</td>
</tr>
<tr>
<td>2011</td>
<td>155.8</td>
<td>126</td>
<td>231.5</td>
</tr>
<tr>
<td>2012</td>
<td>163.1</td>
<td>101.8</td>
<td>225.7</td>
</tr>
<tr>
<td>Arithmetic mean</td>
<td>164.1</td>
<td>119.3</td>
<td>228.6</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

After calculating the arithmetic mean for the EBITDA for the three years before applying LRIC and for three years after applying LRIC, the researcher found that:

Table 39: The Result of Applying LRIC in JTI using EBITDA

<table>
<thead>
<tr>
<th>EBITDA</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arithmetic mean (Before)</td>
<td>172.7</td>
<td>129.5</td>
<td>238</td>
</tr>
<tr>
<td>Arithmetic mean (After)</td>
<td>164.1</td>
<td>119.3</td>
<td>228.6</td>
</tr>
<tr>
<td>Differences</td>
<td>8.6 -</td>
<td>10.2 -</td>
<td>9.4 -</td>
</tr>
<tr>
<td>Result</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
</tr>
</tbody>
</table>

* Source: Author’s own table
Table 40: The Accumulated Variable (Net profit)

<table>
<thead>
<tr>
<th>N. Profit</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>87</td>
<td>90.8</td>
<td>135.1</td>
</tr>
<tr>
<td>2007</td>
<td>94.5</td>
<td>104.1</td>
<td>119.2</td>
</tr>
<tr>
<td>2008</td>
<td>99.33</td>
<td>107.9</td>
<td>134.2</td>
</tr>
<tr>
<td>Arithmetic mean</td>
<td>93.6</td>
<td>100.9</td>
<td>129.5</td>
</tr>
<tr>
<td>2009</td>
<td>103.4</td>
<td>111.7</td>
<td>133.9</td>
</tr>
<tr>
<td>2010</td>
<td>94.8</td>
<td>94.2</td>
<td>143.9</td>
</tr>
<tr>
<td>2011</td>
<td>83.2</td>
<td>83.85</td>
<td>131.6</td>
</tr>
<tr>
<td>2012</td>
<td>89.7</td>
<td>65.34</td>
<td>121.6</td>
</tr>
<tr>
<td>Arithmetic mean</td>
<td>89.2</td>
<td>81.1</td>
<td>132.4</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

After calculating the arithmetic mean of the Net Profit for the three years before applying LRIC and for three years after applying LRIC, the researcher found that:

Table 41: The result of Applying LRIC in JTI using Net Profit Ratio

<table>
<thead>
<tr>
<th>N. Profit</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arithmetic mean (Before)</td>
<td>93.6</td>
<td>100.9</td>
<td>129.5</td>
</tr>
<tr>
<td>Arithmetic mean (After)</td>
<td>89.2</td>
<td>81.1</td>
<td>132.4</td>
</tr>
<tr>
<td>Differences</td>
<td>4.4 -</td>
<td>19.8 -</td>
<td>2.9 +</td>
</tr>
<tr>
<td>Result</td>
<td>Negative</td>
<td>Negative</td>
<td>Positive</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

Table 42: The Accumulated Variable (CAPEX)

<table>
<thead>
<tr>
<th>CAPEX</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>41.7</td>
<td>32.18</td>
<td>25.6</td>
</tr>
<tr>
<td>2007</td>
<td>43.8</td>
<td>33.7</td>
<td>31.9</td>
</tr>
<tr>
<td>2008</td>
<td>42.8</td>
<td>30.7</td>
<td>23.5</td>
</tr>
<tr>
<td>Arithmetic mean</td>
<td>42.8</td>
<td>32.2</td>
<td>27</td>
</tr>
<tr>
<td>2009</td>
<td>53</td>
<td>34.2</td>
<td>20.6</td>
</tr>
<tr>
<td>2010</td>
<td>41</td>
<td>45.9</td>
<td>27.6</td>
</tr>
<tr>
<td>2011</td>
<td>38</td>
<td>42.4</td>
<td>23.8</td>
</tr>
<tr>
<td>2012</td>
<td>36</td>
<td>40.1</td>
<td>31.8</td>
</tr>
<tr>
<td>Arithmetic mean</td>
<td>38.3</td>
<td>42.8</td>
<td>27.7</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.
After calculating the arithmetic mean of the CAPEX for the three years before applying LRIC and for three years after applying LRIC, the researcher found that:

**Table 43: The Result of Applying LRIC in JTI using CAPEX Ratio**

<table>
<thead>
<tr>
<th>CAPEX</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arithmetic mean (Before)</td>
<td>42.8</td>
<td>32.2</td>
<td>27</td>
</tr>
<tr>
<td>Arithmetic mean (After)</td>
<td>38.3</td>
<td>42.8</td>
<td>27.7</td>
</tr>
<tr>
<td>Differences</td>
<td>4.5 -</td>
<td>10.6 +</td>
<td>0.7 +</td>
</tr>
<tr>
<td>Result</td>
<td>Positive</td>
<td>Negative</td>
<td>Negative</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

**6.8 The Second Hypothesis**

**H_{1b}:** The application of LRIC models has had a significant impact on the operational performance variables of Orange, Umniah and Zain in the JTI as measured by Revenues, EBITDA, Net Profit and Capex.

The Table below shows the results of the application of LRIC Model and its impact on operational performance.

**Table 44: Result of Test - The second Sub-Hypothesis**

<table>
<thead>
<tr>
<th>Operational Performance</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>Positive</td>
<td>Positive</td>
<td>Positive</td>
</tr>
<tr>
<td>EBITDA</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
</tr>
<tr>
<td>N. Profit</td>
<td>Negative</td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td>CAPEX</td>
<td>Positive</td>
<td>Negative</td>
<td>Negative</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

From the table the researcher reaches to the results below for this Hypothesis:

- According to the 1\textsuperscript{st} variable Revenue: there is a positive relationship between application of the LRIC model and the revenues of the JTI companies.
- According to the 2\textsuperscript{nd} variable EBITDA: there is a negative relationship between application of the LRIC model and the EBITDA of the JTI companies.
DATA COLLECTION AND ANALYSIS

- According to the 3rd variable Net Profit: there is a negative relationship between application of the LRIC model and the Net Profit of the JTI companies.
- According to the 4th variable CAPEX: there is a negative relationship between application of the LRIC model and the CAPEX of the JTI companies.

6.9 The Third Hypothesis

According to the 3rd hypothesis which stipulates that:

\[ H_{1c} : \text{The application of LRIC models has had a significant impact on the competitive performance variables of Orange, Umniah and Zain in the JTI as measured by Market Share, Customers and Service Cost.} \]

The researcher tries to show the accumulated Competitive Performance’s Variable in the tables below for Customers, Market share, and Service Cost and calculate the arithmetic mean for every variable before applying LRIC and after applying LRIC - which means: Arithmetic mean for the period 2006-2008 and Arithmetic mean for the period 2010-2012. Thereby, the researcher can judge the impact of the application of the LRIC model in the sample of this study.

Note: the researcher left the year of 2009 as a neutral year because the JTI start to apply LRIC in this year.

Table 45: The Accumulated Variable (Customers)

<table>
<thead>
<tr>
<th>Customers</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>1110</td>
<td>929</td>
<td>1961</td>
</tr>
<tr>
<td>2007</td>
<td>1456</td>
<td>1044</td>
<td>1858</td>
</tr>
<tr>
<td>2008</td>
<td>2552</td>
<td>979</td>
<td>2345</td>
</tr>
<tr>
<td>Arithmetic mean</td>
<td>1706</td>
<td>948</td>
<td>2054.7</td>
</tr>
<tr>
<td>2009</td>
<td>1524.6</td>
<td>1952</td>
<td>2260.7</td>
</tr>
<tr>
<td>2010</td>
<td>1928.2</td>
<td>2815</td>
<td>2488</td>
</tr>
<tr>
<td>2011</td>
<td>2676.6</td>
<td>2621</td>
<td>2751</td>
</tr>
<tr>
<td>2012</td>
<td>3397.1</td>
<td>2427</td>
<td>3489</td>
</tr>
<tr>
<td>Arithmetic mean</td>
<td>2667.3</td>
<td>2621</td>
<td>2909.3</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.
After calculating the arithmetic mean for the Customer Base for the three years before applying LRIC and for three years after applying LRIC, the researcher found that:

**Table 46: The result of Applying LRIC in JTI using Customer Ratio**

<table>
<thead>
<tr>
<th>Customers</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arithmetic mean (Before)</td>
<td>1706</td>
<td>948</td>
<td>2054.7</td>
</tr>
<tr>
<td>Arithmetic mean (After)</td>
<td>2667.3</td>
<td>2621</td>
<td>2909.3</td>
</tr>
<tr>
<td>Differences</td>
<td>961.3 +</td>
<td>1673 +</td>
<td>854.6 +</td>
</tr>
<tr>
<td>Result</td>
<td>Positive</td>
<td>Positive</td>
<td>Positive</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

**Table 47: The Accumulated Variable (Market Share)**

<table>
<thead>
<tr>
<th>Market share</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>30%</td>
<td>17%</td>
<td>53%</td>
</tr>
<tr>
<td>2007</td>
<td>33.7%</td>
<td>23.3%</td>
<td>43%</td>
</tr>
<tr>
<td>2008</td>
<td>46.8%</td>
<td>10.1%</td>
<td>43%</td>
</tr>
<tr>
<td>Arithmetic mean</td>
<td>36.83%</td>
<td>16.8%</td>
<td>46.33%</td>
</tr>
<tr>
<td>2009</td>
<td>29%</td>
<td>27%</td>
<td>43%</td>
</tr>
<tr>
<td>2010</td>
<td>31%</td>
<td>29%</td>
<td>40%</td>
</tr>
<tr>
<td>2011</td>
<td>36%</td>
<td>27%</td>
<td>37%</td>
</tr>
<tr>
<td>2012</td>
<td>37%</td>
<td>25%</td>
<td>38%</td>
</tr>
<tr>
<td>Arithmetic mean</td>
<td>34.67%</td>
<td>27%</td>
<td>38.3%</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

After calculating arithmetic mean for the Market Share for the three years before applying LRIC and for three years after applying LRIC, the researcher found that:

**Table 48: The result of Applying LRIC in JTI using Market Share Ratio**

<table>
<thead>
<tr>
<th>Market share</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arithmetic mean (Before)</td>
<td>36.83%</td>
<td>16.8%</td>
<td>46.33%</td>
</tr>
<tr>
<td>Arithmetic mean (After)</td>
<td>34.67%</td>
<td>27%</td>
<td>38.3%</td>
</tr>
<tr>
<td>Differences</td>
<td>2.16% -</td>
<td>10.2% +</td>
<td>8.03% -</td>
</tr>
<tr>
<td>Result</td>
<td>Negative</td>
<td>Positive</td>
<td>Negative</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.
Table 49: The Accumulated Variable (Service Cost)

<table>
<thead>
<tr>
<th>Market Share</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>123.3</td>
<td>101.4</td>
<td>113.9</td>
</tr>
<tr>
<td>2007</td>
<td>161.3</td>
<td>102.6</td>
<td>108.5</td>
</tr>
<tr>
<td>2008</td>
<td>223.7</td>
<td>103.3</td>
<td>137.4</td>
</tr>
<tr>
<td>Arithmetic mean</td>
<td>169.4</td>
<td>102.4</td>
<td>119.9</td>
</tr>
<tr>
<td>2009</td>
<td>133.7</td>
<td>126.3</td>
<td>120.1</td>
</tr>
<tr>
<td>2010</td>
<td>146.3</td>
<td>181.5</td>
<td>150.2</td>
</tr>
<tr>
<td>2011</td>
<td>209.5</td>
<td>169.6</td>
<td>141.7</td>
</tr>
<tr>
<td>2012</td>
<td>257.2</td>
<td>113.4</td>
<td>140.2</td>
</tr>
<tr>
<td>Arithmetic mean</td>
<td>204.3</td>
<td>154.8</td>
<td>144</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

After calculating arithmetic mean for the Service Cost for the three years before applying LRIC and for three years after applying LRIC, the researcher found that:

Table 50: The Result of Applying LRIC in JTI using Service Cost Ratio

<table>
<thead>
<tr>
<th>Service Cost</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arithmetic mean (Before)</td>
<td>169.4</td>
<td>102.4</td>
<td>119.9</td>
</tr>
<tr>
<td>Arithmetic mean (After)</td>
<td>204.3</td>
<td>154.8</td>
<td>144</td>
</tr>
<tr>
<td>Differences</td>
<td>34.9 +</td>
<td>52.4 +</td>
<td>24.4 +</td>
</tr>
<tr>
<td>Result</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

6.9.1 Testing 3rd Hypothesis:

H_{1c}: The application of LRIC model has had a significant impact on the competitive performance variables of Orange, Umniah and Zain in the JTI as measured by Market Share, Customers and Service Cost.

The table below shows the result of the application of LRIC Model on the Competitive Performance during the test, the following Indices:
Table 51: Result of Test - Third Sub-Hypothesis

<table>
<thead>
<tr>
<th>Competitive Performance</th>
<th>Orange</th>
<th>Umniyah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customers</td>
<td>Positive</td>
<td>Positive</td>
<td>Positive</td>
</tr>
<tr>
<td>Market share</td>
<td>Negative</td>
<td>Positive</td>
<td>Negative</td>
</tr>
<tr>
<td>Service Cost</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
</tr>
</tbody>
</table>

* Source: Author's own table.

From the table 51 the researcher reaches the results for this Hypothesis:

- According to the 1st variable Customers: there is a positive relationship between application of the LRIC model and the Customer Base of JTI companies.
- According to the 2nd variable Market share: there is a negative relationship between application of the LRIC model and the Market share of two companies out of three in the JTI companies. (Negative for Orange and positive for both Zain and Orange).
- According to the 3rd variable Service Cost: there is a negative relationship between application of the LRIC model and the Service Cost of JTI companies.

6.10 Data Collected Using the Questionnaire

After analysing the financial statements of the companies, the researcher conducted personal surveys with the target group by distributing questionnaires. Those targeted for the Questionnaire included:

- Financial Managers
- Cost Accountants
- Accounts managers (Chief Accountants)
- Quality Assurance Managers

(Appendix No. 1 shows the Questionnaire that was distributed to the targeted groups as mentioned above)

6.10.1 Data-collection Tools
The preparation of a questionnaire is to determine the impact of the application of the LRIC Model in the JTI on: Performance, Efficiency and Implementation Issues. A group axes study and the number of paragraphs in each area was used.

(Note: the researcher distributed 51 questionnaires to the employees mentioned above and the ratio of return was 100% because the questionnaire was administered as a personal survey with the target group.)

Table 52 shows the number of paragraphs in each area in the questionnaire distributed to the study sample. The questionnaire used a five measure Dimensions Likert Scale in all questions of the questionnaire.

### Table 52: Number of Paragraphs in Each Area

<table>
<thead>
<tr>
<th>S.R</th>
<th>Subject</th>
<th>Number of paragraphs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Financial Performance</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Operational Performance</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Competitive Performance</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>11</strong></td>
</tr>
</tbody>
</table>

* Source: the results of the Field Study.

### 6.10.1.1 Consistency of Data Collection Tools

The researcher used the Cronbach’s Alpha Coefficient to measure the consistency of the questions in the questionnaire that was used in the surveys. Table 53 shows the result of the Cronbach’s Alpha Coefficient according with the questionnaire paragraphs.
It is clear from the results shown in table 53 that the value of Cronbach's alpha coefficient was high for each area, ranging from (0.925 and 0.984). As well as the value of the alpha coefficient for all paragraphs of the questionnaire (0.987). The value of consistency was high for each area, ranging from (0.900 and 0.959), the value of the stability of all the paragraphs of the questionnaire is (0.964), and this means that the reliability coefficient is high.
The tables below show the result of Data collected from the questionnaire:

**Table 54: Questionnaire Result - Financial Performance**

<table>
<thead>
<tr>
<th>No.</th>
<th>Subject</th>
<th>Arithmetic average</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ROE</td>
<td>2.59</td>
<td>1.378</td>
</tr>
<tr>
<td>2</td>
<td>ROA</td>
<td>2.47</td>
<td>1.164</td>
</tr>
<tr>
<td>3</td>
<td>ROS</td>
<td>2.19</td>
<td>1.195</td>
</tr>
<tr>
<td>4</td>
<td>GPM</td>
<td>2.30</td>
<td>1.554</td>
</tr>
</tbody>
</table>

* Source: the results of the Field Study.

**Table 55: Questionnaire Result - Operational Performance**

<table>
<thead>
<tr>
<th>No.</th>
<th>Subject</th>
<th>Arithmetic average</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Revenue</td>
<td>2.59</td>
<td>1.378</td>
</tr>
<tr>
<td>6</td>
<td>EBITDA</td>
<td>2.47</td>
<td>1.164</td>
</tr>
<tr>
<td>7</td>
<td>Net Profit</td>
<td>2.19</td>
<td>1.195</td>
</tr>
<tr>
<td>8</td>
<td>CAPEX</td>
<td>2.30</td>
<td>1.554</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

**Table 56: Questionnaire Result - Competitive Performance**

<table>
<thead>
<tr>
<th>No.</th>
<th>Subject</th>
<th>Arithmetic average</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Customers</td>
<td>2.59</td>
<td>1.378</td>
</tr>
<tr>
<td>02</td>
<td>Market share</td>
<td>2.47</td>
<td>1.164</td>
</tr>
<tr>
<td>03</td>
<td>Service Cost</td>
<td>2.19</td>
<td>1.195</td>
</tr>
</tbody>
</table>

* Source: the results of the Field Study.
6.10.2 Hypothesis Testing

First Hypothesis: $H_{1a}$: The application of LRIC models has had a significant impact on the financial performance variables of Orange, Umniah and Zain in the JTI as measured by ROE, ROA, ROS and GPM.

Table 57: Statistical Results

<table>
<thead>
<tr>
<th>Subject</th>
<th>Statistics</th>
<th>Relationship between LRIC Model and Financial Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRIC Model</td>
<td>Correlation coefficient</td>
<td>0.905</td>
</tr>
<tr>
<td></td>
<td>The level of significance</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>The size of the sample</td>
<td>51</td>
</tr>
</tbody>
</table>

* Source: the results of the Field Study.

From the table the value of the level of significance equals 0.000 and less than 0.05 also, the value of the correlation coefficient is equal to 0.905, which indicates a strong and significantly positive correlation between the application of the LRIC model in the Jordanian telecommunications companies and their Financial Performance.

Second Hypothesis: $H_{1b}$: The application of LRIC models has had a significant impact on the operational performance variables of Orange, Umniah and Zain in the JTI as measured by Revenues, EBITDA, Net Profit and Capex.

Table 58: Statistical Results (2)

<table>
<thead>
<tr>
<th>Subject</th>
<th>Statistics</th>
<th>Relationship between LRIC Model and Operational Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRIC Model</td>
<td>correlation coefficient</td>
<td>0.892</td>
</tr>
<tr>
<td></td>
<td>The level of significance</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>The size of the sample</td>
<td>51</td>
</tr>
</tbody>
</table>

* Source: the results of the Field Study.
As per the above table, the value of the level of significance equals 0.000 and less than 0.05 also the value of the correlation coefficient is equal to 0.892, which indicates a strong and significantly positive relationship with the application of the LRIC model in the Jordanian telecommunications companies and their Operational Performance.

**Third Hypothesis: H\textsubscript{1c}:** The application of LRIC models has had a significant impact on the competitive performance variables of Orange, Umniah and Zain in the JTI as measured by Market Share, Customers and Service Cost.

**Table 59: Statistical Results (3)**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Statistics</th>
<th>Relationship between LRIC Model and competitive Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRIC Model</td>
<td>correlation coefficient</td>
<td>0.862</td>
</tr>
<tr>
<td></td>
<td>The level of significance</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>The size of the sample</td>
<td>51</td>
</tr>
</tbody>
</table>

* Source: the results of the Field Study.

According to the above table, there is a correlation of 0.862 between the two variables with a significant value of 0.00 which is less than 0.05. Therefore, it can be argued that there is a significant and strong positive relationship between the application of the LRIC model in the Jordanian telecommunications companies and their Competitive Performance.

**6.11 Economic Analysis**

Economics Analyses is a part of economic or political economy that deals with the study of relationships between the phenomena of the subsidiary. The methodology of economic analysis is based on refocusing economic phenomenon on the simple elements which can be readily understood, and then the formulation of an explanatory hypothesis of this phenomenon based on causal relationships ([www.arab-ency.com](http://www.arab-ency.com)).
In order to achieve the main objective of this study the researcher has thus far used two types of analysis, the first was ratio analysis including financial performance ratios such as ROI, ROE, ROA, ROS and GPM, operational performance ratios such as Revenue, EBITDA, Capex and Net profit and competitive performance indicators such as consumer base, market share and service cost. The second data collection and analysis tool used in this study was the questionnaire which was distributed among target groups and conducted in the form of a personal survey. Due to the complex nature of these type of studies, the researcher further extended the data analysis and undertakes an economic analysis, in order to confirm the previous conclusions reached.

6.11.1 Definition of Economic Analysis

The Economic analysis is defined as an orderly way to deal with deciding the ideal utilisation of rare resources, including correlation of two or more choices in accomplishing a particular goal under certain hypotheses and requirements, economic analysis considers opportunity cost of assets utilised and endeavours to gauge, in financial related terms, the private and public expenses and advantages of an organisation to the community economy (www.businessdictionary.com).

6.11.2 Relationship between Accounting and Economics

Accounting scholars usually concentrate on what was accomplished in economics, yet economics scholars remained apathetic regarding accounting research. Scapens (1991) argued that the economic structure assumed the focal part when accounting scholars attempted to build decision making systems for the improvement of management accounting theory. Accounting scholars were, thusly, inspired by systematic apparatuses and speculations of financial aspects.

Shiozawa (1998) pointed out that a corresponding interest for accounting was never seen in economics textboxes. During the 1950s and 1960s, economics scholars were glad that their science achieved the level of an accurate science. Economics was accepted on its merit. In this way, economics science neither improved from accounting, nor differed from sciences. Shiozawa (1998) illustrated that scholarly experts in accounting considered it to be a confusing state of affairs and pushed to seek a comparative role to
economics. Scapens (1991) contended this is identified with accountant’s longings to accomplish the scholarly respectability of management accounting.

These circumstances are not unique with economics and other sociologies or disciplines. Regardless of sciences' craving for autonomy, there has been a leaning in political discipline and sociology to obtain new thoughts from economic science. In economics there were calls by some for an interdisciplinary approach in economics and other sociologies. Standard economic scholars did not view any lack which ought to be supplemented by other sociologies. Economics scholars trusted that economic science was absolutely integrated by itself.

### 6.11.3 Accounting profit and Economic Profit

Cunningham et al. (2010) explained that accounting revenue is the contrast between aggregate financial income and aggregate money related costs and is calculated by utilising proper accounting rules known as (GAAP). Accounting revenue is the same as recorded expenses and comprises of (credit and debit) assets liabilities on a company's balance sheet statement. These comprise of the expenses of a company related directly to the production processes (for instance: salaries, lease and material expenses). The fiscal income what a firm gets subsequent to selling its item in the market.

Farahani and Manjappa (2008) illustrated that economic revenue is the contrast between aggregate money related income and aggregate expenses. However, costs incorporate both implicit and explicit expenses. Economic revenue incorporates the opportunity cost connected with producing goods and is, along these lines, less than accounting revenue. Economic revenue likewise represents a more drawn out range of time than accounting revenue. Economic analysts frequently take into account long-run economic revenue to make decisions on whether a company ought to get in or leave a business sector.

The figure 50 shows the contrast between accounting and economic revenue.
Opportunity costs will be taken into account when calculating economic profit, while these costs will not be considered in the process of the accounting profit calculation.

For the purposes of economic analysis, it relies on two basic equations between price and quantity. It is an important relationship between price and quantity in economic terms as well as from the accounting point of view, and has a great effect on the outcome of business companies, it is calculated as the elasticity of demand equation.

For the purposes of economic analysis, quantity must be clarified. The quantity here was expressed as a number of minutes or calls. Technically reference to quantity in the telecommunications sector is termed traffic, the traffic is a number of total annual outgoing and incoming calls from or to the companies. It can be expressed by measuring the flow of calls and traffic between telecommunications companies.

This study focuses on verifying the telecommunications market in total (wholesale market), especially on the so-called interconnection services. Which obliges companies to link with each other to ensure communication continues to subscribers regardless of their companies, networks or subscribers. This is exactly what the Telecommunications Regulatory Commission is seeking to entrench and supply.
In the accounting approach, in practice the company's total revenue arises from multiplying the number of minutes per call by the service price for the minute. Thus, the number of minutes is a unit of measurement. The second element or party equation is price, with is referred to as the price of the interconnection services.

In practice, the TRC in most countries of the world has adopted the so-called LRIC model for the pricing of interconnection between telecommunications companies.

### 6.11.4 Economic Analysis Tools

With reference to what has already been completed previously, the first economic equation which has been adopted here for the purposes of economic analysis is: Elasticity of demand.

**Elasticity of Demand:**

\[
E(R) = \frac{d Q}{d P} \frac{Q}{P}
\]

\[
\text{When:}
\]

- Quantity: Total Annual Traffic (TAT)
- Price: Interconnection Rates (IR)

Where the Elasticity of demand is: the output of the division of the rate of change in quantity on the rate of change in price.

So the shape of the equation above will be as follows:

\[
\frac{\Delta TAT}{TAT} \cdot \frac{\Delta IR}{IR}
\]

- Elasticity of Demand = \[
\text{......... (6)}
\]

In order to ensure the integrity of the results, the researcher uses the other equation, derived from the equation of elasticity of demand - the elasticity of substitution, which is
concerned with stability, one variable for a company with the change of variables for other companies. It can be expressed as dividing the rate of change in the quantity of the first company on the rate of change in the price of the second company.

Elasticity of Substitution:

\[
\text{Elasticity of Substitution} = \frac{\Delta TAT_1 / TAT_1}{\Delta IR_2 / R_2} \quad (7)
\]

This will identify the most elastic company and thus provide a full and comprehensive picture, which shows the nature of competition between the Jordanian telecommunications companies by analysing the impact of the application of LRIC model on the efficiency of the performance of the company's competitive position and financial and operational economics.

6.11.5 Total Annual Traffic

Here the researcher tried to obtain traffic for each company, for each year of study by communicating directly over the telephone with financial managers and costs managers. They were sent formal requests to collect such data and given the necessary information regarding the purposes of the study. They were also reassured that the data received from them will only be used for this study with a pledge to confidentiality and privacy. Since this data is very sensitive and characterised as secret, the researcher was unable to get consent from those personnel.

The researcher communicated directly to the specialists Managers in the Jordanian Communications Commission in another attempt to get this data, but the result was similar. The total annual traffic of the three Jordanian companies was officially published on the TRC website, but not in detail.

In order to get the annual detail for traffic for every company, the researcher used the Market share for each company; it was officially published and previously addressed in the competition analysis for each company.
DATA COLLECTION AND ANALYSIS

Table 60 shows calculations of total annual traffic for each company by using the market share for each company.

Table 60: Market Share for Each Company/Year

<table>
<thead>
<tr>
<th></th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>30%</td>
<td>17%</td>
<td>53%</td>
</tr>
<tr>
<td>2007</td>
<td>33.70%</td>
<td>23.30%</td>
<td>43%</td>
</tr>
<tr>
<td>2008</td>
<td>46.80%</td>
<td>10.20%</td>
<td>43%</td>
</tr>
<tr>
<td>2009</td>
<td>30%</td>
<td>27%</td>
<td>43%</td>
</tr>
<tr>
<td>2010</td>
<td>31%</td>
<td>29%</td>
<td>40%</td>
</tr>
<tr>
<td>2011</td>
<td>36%</td>
<td>27%</td>
<td>37%</td>
</tr>
<tr>
<td>2012</td>
<td>37%</td>
<td>25%</td>
<td>38%</td>
</tr>
<tr>
<td>2013</td>
<td>38%</td>
<td>23%</td>
<td>39%</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

Table 61: Total Annual Traffic for Each Company/Year

<table>
<thead>
<tr>
<th>Years</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic</td>
<td>7456</td>
<td>10878</td>
<td>14727</td>
<td>18212</td>
<td>21473</td>
<td>27762</td>
<td>35653</td>
</tr>
<tr>
<td>Orange</td>
<td>2236.8</td>
<td>3665.886</td>
<td>6892.236</td>
<td>5463.6</td>
<td>6656.63</td>
<td>9994.32</td>
<td>13191.61</td>
</tr>
<tr>
<td>Umniah</td>
<td>1267.52</td>
<td>2534.574</td>
<td>1502.154</td>
<td>4917.24</td>
<td>6227.17</td>
<td>7495.74</td>
<td>8913.25</td>
</tr>
<tr>
<td>Zain</td>
<td>3951.68</td>
<td>4677.54</td>
<td>6332.61</td>
<td>7831.16</td>
<td>8589.2</td>
<td>10271.94</td>
<td>13548.14</td>
</tr>
<tr>
<td>Totals</td>
<td>7456</td>
<td>10878</td>
<td>14727</td>
<td>18212</td>
<td>21473</td>
<td>27762</td>
<td>35653</td>
</tr>
</tbody>
</table>

* The Total Annual Traffic (Millions Of Minutes)
** The Total Annual Traffic of Company (x) = Total Annual Traffic * Market Share of Company (x)
**** Source: Author’s own table.

The figure shows the total annual traffic during the study period.
DATA COLLECTION AND ANALYSIS

Figure 51: The Total Annual Traffic During the Study Period, for Orange, Umniah and Zain

![Graph showing annual traffic for Orange, Umniah, and Zain](image)

* Source: Author’s own table.

Figure 51 shows the total annual traffic for each Orange, Umniah and Zain before using the LRIC model. As per the figure there is a noticeable increase in the total annual traffic for Orange and Zain for the years 2006-2008, but for Umniah, there is a decrease in the total annual traffic during 2008.

This figure also shows the total annual traffic for Orange, Umniah and Zain after using the LRIC model. There is some increase in this total annual traffic for Orange and Zain, and a slight increase for Umniah for the period 2010-2012.

### 6.11.6 Interconnection Rates (IR)

The table below presents the price of interconnection services of the three companies that were posted on their official websites. The figure shows the Prices of interconnection services during the period of study.

#### Table 62: Rates Per Minute

<table>
<thead>
<tr>
<th>Rate per minute (fils)</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zain</td>
<td>37.9</td>
<td>34.87</td>
<td>32</td>
<td>25.8</td>
<td>22.4</td>
<td>20.05</td>
<td>17.69</td>
</tr>
<tr>
<td>Orange</td>
<td>39.6</td>
<td>36.43</td>
<td>32.9</td>
<td>27.2</td>
<td>22.6</td>
<td>20.2</td>
<td>17.79</td>
</tr>
<tr>
<td>Umniah/Xpress</td>
<td>52.5</td>
<td>48.38</td>
<td>42.5</td>
<td>30.2</td>
<td>27.7</td>
<td>24.02</td>
<td>20.34</td>
</tr>
</tbody>
</table>

* The Interconnection Rates of the Jordanian Telecommunications services providers (Fils/Minutes, 1 JOR Fils =GBP Pence 0.92)

As per figure 52, it was noted that before using the LRIC model there is a continued decrease in the interconnection rates of all three companies from 2006 to 2008. After using the LRIC model, the decrease continued until 2012.

**6.11.7 Analysis of the Elasticity of Demand**

The table below shows the total traffic in millions of minutes per year for each company during the period of study.

**Table 63: The Total Traffic in Million of Minutes per year**

<table>
<thead>
<tr>
<th>Years</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange</td>
<td>7456</td>
<td>10878</td>
<td>14727</td>
<td>18212</td>
<td>21473</td>
<td>27762</td>
<td>35653</td>
<td>34927</td>
</tr>
<tr>
<td>Umniah</td>
<td>2236.8</td>
<td>3665.886</td>
<td>6892.236</td>
<td>5463.6</td>
<td>6656.63</td>
<td>9994.32</td>
<td>13191.61</td>
<td>13272.26</td>
</tr>
<tr>
<td>Zain</td>
<td>1267.52</td>
<td>2534.574</td>
<td>1502.154</td>
<td>4917.24</td>
<td>6227.17</td>
<td>7495.74</td>
<td>8913.25</td>
<td>8033.21</td>
</tr>
<tr>
<td>Totals</td>
<td>7456</td>
<td>10878</td>
<td>14727</td>
<td>18212</td>
<td>21473</td>
<td>27762</td>
<td>35653</td>
<td>34927</td>
</tr>
</tbody>
</table>

* Source: Author's own table.
DATA COLLECTION AND ANALYSIS

The second part for the elasticity of demand equation is the IR, so the table below shows the rate per minute during the period of study for each company:

Table 64: The Rate per minute during the Study Period

<table>
<thead>
<tr>
<th>Rate per minute (fils)</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange</td>
<td>39.6</td>
<td>36.43</td>
<td>32.9</td>
<td>27.2</td>
<td>22.6</td>
<td>20.2</td>
<td>17.79</td>
<td>15.34</td>
</tr>
<tr>
<td>Umniah/ Xpress</td>
<td>52.5</td>
<td>48.38</td>
<td>42.5</td>
<td>30.2</td>
<td>27.7</td>
<td>24.02</td>
<td>20.34</td>
<td>15.39</td>
</tr>
<tr>
<td>Zain</td>
<td>37.9</td>
<td>34.87</td>
<td>32</td>
<td>25.8</td>
<td>22.4</td>
<td>20.05</td>
<td>17.69</td>
<td>16.67</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

Now the researcher calculated the % ∆ in traffic for each company and each year during the period of study.

Table 65: Percentage ∆ of traffic During the Study Period

<table>
<thead>
<tr>
<th>Years</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>% D in Traffic</td>
<td>0.31458</td>
<td>0.261357</td>
<td>0.191357</td>
<td>0.151865</td>
<td>0.226533</td>
<td>0.221328</td>
<td>-0.02079</td>
</tr>
<tr>
<td>Orange</td>
<td>0.389834</td>
<td>0.468114</td>
<td>-0.26148</td>
<td>0.179224</td>
<td>0.333959</td>
<td>0.242373</td>
<td>0.006077</td>
</tr>
<tr>
<td>Umniah</td>
<td>0.499908</td>
<td>-0.68729</td>
<td>0.694513</td>
<td>0.210357</td>
<td>0.169239</td>
<td>0.159034</td>
<td>-0.10955</td>
</tr>
<tr>
<td>Zain</td>
<td>0.15518</td>
<td>0.261357</td>
<td>0.191357</td>
<td>0.088255</td>
<td>0.163819</td>
<td>0.241819</td>
<td>0.005388</td>
</tr>
</tbody>
</table>

* % ∆ in Traffic = TAT₂ - TAT₁ / TAT₂
* Source: Author’s own table.

Table 66: Percentage ∆ in Rate

<table>
<thead>
<tr>
<th>Years</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange</td>
<td>-0.08702</td>
<td>-0.10729</td>
<td>-0.20956</td>
<td>-0.20354</td>
<td>-0.11881</td>
<td>-0.13547</td>
<td>-0.15971</td>
</tr>
<tr>
<td>Umniah</td>
<td>-0.08516</td>
<td>-0.13835</td>
<td>-0.40728</td>
<td>-0.09025</td>
<td>-0.15321</td>
<td>-0.18092</td>
<td>-0.32164</td>
</tr>
<tr>
<td>Zain</td>
<td>-0.08689</td>
<td>-0.08969</td>
<td>-0.24031</td>
<td>-0.15179</td>
<td>-0.11721</td>
<td>-0.13341</td>
<td>-0.06119</td>
</tr>
</tbody>
</table>

* % Δ in Traffic = IR₂ - IR₁ / IR₂
* Source: Author’s own table.

The researcher calculated the % ∆ in rate for each company and each year during the period of study as presented in table 67.
After applying the elasticity of demand equation, below results were obtained as per table 66.

**Table 67: The Elasticity of Demand During the Study Period**

<table>
<thead>
<tr>
<th>Years</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange</td>
<td>4.480013</td>
<td>4.362873</td>
<td>1.247776</td>
<td>0.880537</td>
<td>2.810819</td>
<td>1.789135</td>
<td>0.038047</td>
</tr>
<tr>
<td>Umniah</td>
<td>5.87028</td>
<td>4.967679</td>
<td>1.705226</td>
<td>2.330758</td>
<td>1.104651</td>
<td>0.879009</td>
<td>0.340602</td>
</tr>
<tr>
<td>Zain</td>
<td>1.785849</td>
<td>2.914082</td>
<td>0.796293</td>
<td>0.581445</td>
<td>1.397691</td>
<td>1.812619</td>
<td>0.088053</td>
</tr>
</tbody>
</table>

* Elasticity = [ % ∆ in Traffic / % ∆ in Rate ]

**Source:** Author’s own table.

The figure also shows the Prices of Elasticity of Demand during the period under study.

**Figure 53: The Elasticity of Demand During the Period of Study**

As illustrated in figure 53 before using the LRIC model, there is a noticeable decrease in the Elasticity of Demand for Orange and Umniah. Zain also had a decrease in the Elasticity of Demand.

The figure also shows the Elasticity of Demand for each company after using the LRIC model. It was found that there is a continues to decrease in Elasticity of Demand for Orange
and Zain, and a slight but continuous decrease for Umniah for the period 2010-2012. But, all these figures for Elasticity of Demand for the three companies are less than 1.

### 6.11.8 Analysis of the Elasticity of Substitution

After applying the elasticity of substitution, the results below were obtained.

**Table 68: The Elasticity of Substitution During the Study Period**

<table>
<thead>
<tr>
<th>Elasticity Of Substitution For Orange/(Umniah and Zain)</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Years</td>
<td>2006</td>
<td>2007</td>
<td>2008</td>
<td>2009</td>
<td>2010</td>
<td>2011</td>
<td>2012</td>
</tr>
<tr>
<td>% Δ in Traffic of Orange</td>
<td>0.38983</td>
<td>0.46811</td>
<td>0.26148</td>
<td>0.17922</td>
<td>0.33396</td>
<td>0.24237</td>
<td>0.00608</td>
</tr>
<tr>
<td>% Δ in Rate of Umniah</td>
<td>0.08516</td>
<td>0.13835</td>
<td>0.40728</td>
<td>0.09025</td>
<td>0.15321</td>
<td>0.18092</td>
<td>0.32164</td>
</tr>
<tr>
<td>% Δ in Rate of Zain</td>
<td>0.08689</td>
<td>0.08969</td>
<td>0.24031</td>
<td>0.15179</td>
<td>0.11721</td>
<td>0.13341</td>
<td>0.06119</td>
</tr>
<tr>
<td>Elasticity Of Substitution For Orange/Umniah</td>
<td>4.577619</td>
<td>3.38352</td>
<td>0.642015</td>
<td>1.985817</td>
<td>2.179753</td>
<td>1.339653</td>
<td>0.018903</td>
</tr>
<tr>
<td>Elasticity Of Substitution For Orange/Zain</td>
<td>4.486477</td>
<td>5.219199</td>
<td>1.088095</td>
<td>1.18071</td>
<td>2.849245</td>
<td>1.81673</td>
<td>0.099363</td>
</tr>
<tr>
<td>Elasticity Of Substitution For Orange/Orange</td>
<td>4.48001</td>
<td>4.36287</td>
<td>1.24778</td>
<td>0.88054</td>
<td>2.81082</td>
<td>1.78914</td>
<td>0.03805</td>
</tr>
</tbody>
</table>

* Elasticity of Substitution for Orange = [ %Δ in Traffic (Orange) / % Δ in Rate (Umniah and Zain) ]

** Source: Author’s own table. 
The figure also shows the Prices of Elasticity of Substitution for Orange Company during the period under study:

Figure 54: The Elasticity of Substitution for Orange During the Study Period

** Source: Author's own figure.**

Figure 54 shows the Elasticity of Substitution for Orange, Umniah and Zain before applying the LRIC model. It was noted that there is a noticeable decrease in the Elasticity of Substitution for Orange and Umniah with an amount less than 1 for the years 2006-2008. The Elasticity of Substitution for Orange company and Zain also decreased, but was greater than 1 for the years 2006-2008.

This figure shows the Elasticity of Substitution for Orange, Umniah and Zain after applying the LRIC model. As per the figure, there are also continuous decreases in these figures of Elasticity of Substitution for Orange, Umniah and Zain for the period 2010-2012. But, all these figures of Elasticity of Substitution for the three companies are less than 1.

6.11.9 The Elasticity of Substitution For Umniah Orange and Zain

Table 68 reflects the results obtained after applying the elasticity of demand per unit equation.
Table 69: Elasticity of Substitution for Umniah, Orange and Zain

<table>
<thead>
<tr>
<th>Years</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Δ in Traffic of Umniah</td>
<td>0.49991</td>
<td>0.68729</td>
<td>0.69451</td>
<td>0.21036</td>
<td>0.16924</td>
<td>0.15903</td>
<td>0.10955</td>
</tr>
<tr>
<td>%Δ in Rate of Orange</td>
<td>0.08702</td>
<td>0.10729</td>
<td>0.20956</td>
<td>0.20354</td>
<td>0.11881</td>
<td>0.13547</td>
<td>0.15971</td>
</tr>
<tr>
<td>% Δ in Rate of Zain</td>
<td>0.08689</td>
<td>0.08969</td>
<td>0.24031</td>
<td>0.15179</td>
<td>0.11721</td>
<td>0.13341</td>
<td>0.06119</td>
</tr>
<tr>
<td>Elasticity Of Substitution For Umniah/Orange</td>
<td>5.744771</td>
<td>6.405909</td>
<td>3.314134</td>
<td>1.033507</td>
<td>1.424459</td>
<td>1.173913</td>
<td>0.685931</td>
</tr>
<tr>
<td>Elasticity Of Substitution For Umniah/Zain</td>
<td>5.753366</td>
<td>7.66295</td>
<td>2.890059</td>
<td>1.385862</td>
<td>1.443904</td>
<td>1.19204</td>
<td>1.790325</td>
</tr>
<tr>
<td>Elasticity Of Substitution For Umniah/Umniah</td>
<td>5.87028</td>
<td>4.96768</td>
<td>1.70523</td>
<td>2.33.076</td>
<td>1.10465</td>
<td>0.87901</td>
<td>0.3406</td>
</tr>
</tbody>
</table>

* Elasticity of Substitution for Umniah = [ % Δ in Traffic (Umniah) / % Δ in Rate (Orange and Zain) ]

** Source: Author’s own figure.

The figure shows the Prices of Elasticity of Substitution for Umniah during the period under study.

Figure 55: Elasticity of Substitution for Umniah During the Study Period

** Source: Author’s own figure.
As per figure 55, before applying the LRIC model, there is a noticeable decrease in the Elasticity of Substitution for Umniah, Orange and Zain for the years 2006-2008. But, all of these figures of Elasticity of Substitution for the three companies are less than 1.

The Elasticity of Substitution for Umniah, and Zain after applying the (LRIC) model is also shown. According to the figure, there is a noticeable increase in the Elasticity of Substitution for Umniah and Zain with an amount of greater than 1 for the years 2010-2012. In contrast, the Elasticity of Substitution of Umniah and Orange decreased, with an amount of less than 1 for the years 2010-2012.

6.11.10 The Elasticity of Substitution for Zain, Orange and Umniha

The results obtained after applying the elasticity of Substitution equation is presented in table 70.

Table 70: The Elasticity of Substitution During the Period of Study

<table>
<thead>
<tr>
<th>Elasticity Of Substitution For Zain/(Orange and Umniha)</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>% ∆ in Traffic of Zain</td>
<td>0.15518</td>
<td>0.26136</td>
<td>0.19136</td>
<td>0.08826</td>
<td>0.16382</td>
<td>0.24182</td>
<td>0.00539</td>
</tr>
<tr>
<td>% ∆ in Rate of Orange</td>
<td>0.08702</td>
<td>0.10729</td>
<td>0.20956</td>
<td>0.20354</td>
<td>0.11881</td>
<td>0.13547</td>
<td>0.15971</td>
</tr>
<tr>
<td>% ∆ in Rate of Umniha</td>
<td>0.08516</td>
<td>0.13835</td>
<td>0.40728</td>
<td>0.09025</td>
<td>0.15321</td>
<td>0.18092</td>
<td>0.32164</td>
</tr>
<tr>
<td>Elasticity Of Substitution For Zain/Orange</td>
<td>1.783268</td>
<td>2.436015</td>
<td>0.913151</td>
<td>0.433625</td>
<td>1.37884</td>
<td>1.785045</td>
<td>0.033749</td>
</tr>
<tr>
<td>Elasticity Of Substitution For Zain/Umniha</td>
<td>1.822217</td>
<td>1.889122</td>
<td>0.469849</td>
<td>0.97795</td>
<td>1.069251</td>
<td>1.336613</td>
<td>0.016758</td>
</tr>
<tr>
<td>Elasticity Of Substitution For Zain/Zain</td>
<td>1.78585</td>
<td>2.91408</td>
<td>0.79629</td>
<td>0.58144</td>
<td>1.39769</td>
<td>1.81262</td>
<td>0.08805</td>
</tr>
</tbody>
</table>

* Elasticity of Substitution for Zain = | % ∆ in Traffic (Zain) / % ∆ in Rate (Orange and Umniha) |
** Source: Author’s own figure.
The figure also presents the Price of Elasticity of Substitution for Zain during the period of study.

Figure 56: The Elasticity of Substitution of Zain During the Period of Study

**Source: Author's own figure.**

Figure 56 explains that there is a noticeable decrease in the Elasticity of Substitution for Zain, Orange and Umniah for the years 2006-2008 before applying the LRIC model. All of these figures of Elasticity of Substitution for the three companies are less than 1.

After applying the (LRIC) model, the decrease of Elasticity of Substitution for Zain, Orange and Umniah was continual to 2012. All these figures of Elasticity of Substitution for the three companies are also less than 1.

In conclusion, the reader is reminded of the hypotheses that emerged from the conceptual model. To avoid further repetition, they are set out descriptively followed by their summary equations.

H1: The application of LRIC models has had a significant impact on the performance variables of Orange, Umniah and Zain in the JTI. This hypothesis implies a general formulation.

These hypotheses lend themselves to a general equation (1) and a set of particular equations, $H_{1a} - H_{1c}$ as follows.

$$Y^i_j(FP, OP, CP) - Y^k_j(FP, OP, CP) + E = f(LRIC^{2009}) \quad \text{................. (1)}$$
H_{1a}: The application of LRIC models has had a significant impact on the financial performance variables of Orange, Umniah and Zain in the JTI as measured by ROE, ROA, ROS and GPM.

\[ Y_j^i (FP) - Y_j^k (FP) + E = f(LRIC^{2009}) \]  \hspace{1cm} (2)

H_{1b}: The application of LRIC models has had a significant impact on the operational performance variables of Orange, Umniah and Zain in the JTI as measured by revenues, EBITDA, Net Profit and Capex.

\[ Y_j^i (OP) - Y_j^k (OP) + E = f(LRIC^{2009}) \]  \hspace{1cm} (3)

H_{1c}: The application of LRIC models has had a significant impact on the competitive performance variables of Orange, Umniah and Zain in the JTI as measured by Market Share, Customers and Service Cost.

\[ Y_j^i (CP) - Y_j^k (CP) + E = f(LRIC^{2009}) \]  \hspace{1cm} (4)

6.12 Conclusion

This chapter presented the data collected in detail; it described the statistical analysis and showed the findings and results.

The development of the chapter was as follows. It begin by relating the research data gathered over the period to the hypotheses and their expression in equation form. It is appropriate first to consider the three sub hypotheses H1A, H1B, H1C and then consider hypothesis H1 in its entirety, which is contingent on findings with respect to sub hypotheses.

For the reader’s convenience, results relating to the first hypothesis are summarized before they are discussed in more detail later in the chapter. At the end of the chapter, the author has provided a summary relating to the hypotheses as set out in an earlier chapter.
CHAPTER SEVEN

DISCUSSION RESULTS, FINDINGS, RECOMMENDATIONS, LIMITATIONS and FUTURE RESEARCH

Overview

Briefly, each chapter of this research study has provided a contribution towards achieving the main aim of the study. Chapter two outlined the emergence of the LRIC model from an economic perspective, which has a long tradition in economics beginning with Adam Smith’s Deer–Beaver model, which expresses the notion of opportunity cost. This chapter also presented the relationship between management accounting perspectives and economics by using the term marginal cost method for pricing and costing. Chapter three described the context of the study, the JTI its structure and relationship to the Jordanian economy and its developments through identifying the two main parties in the JTI, namely: TRC (regulator) and the Jordanian telecommunications firms Orange, Umniah and Zain in terms of providing some related facts and details to understand and specify the nature of the Jordanian context for this research study. Chapter four addressed the evolution of the LRIC model from its foundations it identified alternative economic theories of cost and also the management accounting tradition. With the intention of applying the theoretical framework for understanding the empirical data. The appropriate methodology and research methods was discussed in chapter five. Chapter six, clarified and specified the methodological and empirical base of the research study by comparing the outputs from applying LRIC methodologies in the selected firms in the JTI.

This structure directly links to the goal of providing an empirically framework to answer the main question of this research study, which is the key research questions concerning the impact of applying the LRIC model in the JTI over the period 2006-2012 and particular reference to its impact (a) on firm performance in the JTI and (b) firm efficiency with respect to financial, operational and competitiveness indicators. Moreover, particular attentions is paid to other issues e.g. standard definitions of LRIC,
LRIC methodology, JTI data of the three firms, considerations of alternatives, emergence of LRIC as a concept, implementations issues and recommendations.

Finally, this chapter considers these questions theoretically and provides an analysis and discussion inspired by the contextual framework that has been developed in chapter five, and is dependent on the data gathered and results provided in chapter six. The ultimate goal of this chapter is to explain the impact of the application of the LRIC model on the efficiency of the firms performance in terms of: Financial, Operational and Competitive performance by designing an efficiency model that includes essential factors that impact the efficiency of the JTI. It develops a set of recommendations relating to assessing the performance and efficiency of the firms in the JTI based on a correlation matrix and heat map generated from the matrix. The remaining sections introduce the main findings of the study, research limitations and avenues for future research.

7.1 Summary of Research Aims Objectives and Results

7.1.1 Research Aims

The central aim of the research is the examination of the impact of the application of the LRIC model - adopted and applied as an interconnection cost model by the Jordanian TRC and Jordanian telecommunications companies (operators) - on the three firms in the JTI in terms of the implementation and efficiency issues over the period 2006-2012, and their impact on the performance of the firms in the JTI through the related performance aspects: financial, operations, competition and efficiency, using secondary and primary data gathered by the researcher over the period 2013-2015.

To achieve the central aim as set out above, the following specific objectives are addressed:

1. To examine the impact of the application of the LRIC models on a vector of performance issues, (a) within firms, (b) between firms, using a variety of accounting data; financial, operational, competitive.
2. To examine the impact of the application of the LRIC models on efficiency (a) within firms, (b) between firms, using the accounting data in the above.
3. To design an efficiency model that includes the essential factors that impact on the JTI efficiency through the application of the LRIC model.

4. To develop a set of recommendations relating to assessing the performance and efficiency of the firms in the JTI based on a correlation matrix and heat map generated from the matrix on how best to increase the efficiency of the JTI by implementing the LRIC model on the basis of 3 above.

### 7.1.2 Research Objectives

To achieve the objectives set out above, the objectives of this research are:

1. To design a conceptual model relating to the aims above and gather and analyse the relevant data.

2. To relate the accounting data gathered in the research to economic issues underlying performance and efficiency.

3. To demonstrate how the concept of LRIC has emerged from economic and accounting analysing and literature.

4. To address the evolution of the LRIC model from its foundation in the economic theory of cost and also the management accounting tradition.

5. To examine, clarify and specify the methodological and empirical base of the study.

6. To compare the outputs from applying the LRIC methodologies in the selected firms in the JTI to each other.

7. To describe the context of the study, the JTI its structure and relation to the Jordanian economy and its developments.

8. To examine and specify the empirical base of the study.

Accordingly, chapters 2-5 relate to the laid the foundations to address the aims in the chapters 6 and 7.
7.1.3 Synthesis of Results

In the following section, the results described in the previous chapters are discussed and synthesised. For the reader’s convenience some tables from previous chapters are repeated here alongside the discussion.

The details of the data are contained in the previous chapters here arrows are used to indicate the direction of changes:

↑ Increase/positive - variable increased over 2 periods (2006-2008/2010-2012).

The decrease arrow describes the change in the variables concerned in 2010-2012 as compared to 2006-2008.

7.2 Summary of Accounting Results

The following tables summarise the direction changes in the relationship between the applications of the LRIC model the indicators of the Financial, Operational and Competitive Performances for Orange, Zain and Umniah for the compared periods (2006-2008 and 2010-2012).

Table 71: Comparative Results (first Sub-Hypothesis)

<table>
<thead>
<tr>
<th>Financial Performance</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROE</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>ROA</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>ROS</td>
<td>↓</td>
<td>↓</td>
<td>↑</td>
</tr>
<tr>
<td>GPM</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

Table 72: Comparative Results (Second Sub-Hypothesis)

<table>
<thead>
<tr>
<th>Operational Performance</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>EBITDA</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>N. Profit</td>
<td>↓</td>
<td>↓</td>
<td>↑</td>
</tr>
<tr>
<td>CAPEX</td>
<td>↑</td>
<td>↓</td>
<td>↓</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.
DISCUSSION RESULTS, FINDINGS, RECOMMENDATIONS, LIMITATIONS and FUTURE RESEARCH

Table 73: Comparative Results of Test (Third Sub-Hypothesis)

<table>
<thead>
<tr>
<th>Competitive Performance</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customers</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Market share</td>
<td>↓</td>
<td>↑</td>
<td>↓</td>
</tr>
<tr>
<td>Service Cost</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
</tr>
</tbody>
</table>

* Source: Author's own table.

7.2.1 Financial Performance

The tables above explain that there is a noticeable relationship (whether, it is positive or negative) between the application of the LRIC model and the indicators of financial performance (ROE, ROA, ROS and GPM) for Orange, Zain and Umniah for the two periods 2006-2008 and 2010-2012.

The imposition of the LRIC model between the two periods was associated with a reduction in all financial variables in all firms, with a single reverse effect in the case of Zain, where ROS increased.

7.2.2 Operational Performance

The tables show the direction changes and the relationship between the applications of the LRIC Model the indicators of the operational performance for Orange, Zain and Umniah for the two compared periods. In all firms’ revenue increased in the second period 2010-2012 as compared the first period (2006-2008).

According to the table 72, it can be seen that there is a relationship (whether, positive or negative) between the application of the LRIC model and the indicators of operational performance (Revenue, EBITDA, Net Profit and CAPEX) for Orange, Zain and Umniah for the years 2006-2012. Generally, all of these indicators of operational performance for the three companies have a negative relationship (except the Revenue indicator, which for the three companies has a positive relationship with the application of LRIC model). While, the Net Profit indicator also has a positive relationship for Zain and the CAPEX indicator has a positive indicators for Orange.

7.2.3 Competitive Performance
Table 73 shows the direction of changes and the relationship between the applications of the LRIC Model the indicators of competitive performance for Orange, Zain and Umniyah for the two periods (2006-2008 and 2010-2012).

In customer demand, which is measured by the number of subscribers, there appears to be a reduction in the service costs. In addition, there was a reduction of market share over the two periods for all companies, except Umniyah, which has gained market share.

Table 73 emphasises that there is a noticeable relationship (whether, positive or negative) between the application of the LRIC model and the indicators of competitive performance (Customers, Market share and Service Cost) for the Orange, Zain and Umniyah for the period 2006-2012.

The customers indicator has a positive relationship in the above mentioned companies and the market share indicator of Umniyah also had a positive relationship with the application of the LRIC model despite the other indicators (market share and service cost indicators in general have a negative relationship).

Returning to the hypotheses. Three parts of the main hypothesis one are supported.

\[ H_{1a}: \] The application of LRIC models has had a significant impact on the financial performance variables of Orange, Umniyah and Zain in the JTI as measured by ROE, ROA, ROS and GPM.

\[ H_{1b}: \] The application of LRIC models has had a significant impact on the operational performance variables of Orange, Umniyah and Zain in the JTI as measured by Revenues, EBITDA, Net Profit and Capex.

\[ H_{1c}: \] The application of LRIC models has had a significant impact on the competitive performance variables of Orange, Umniyah and Zain in the JTI as measured by Market Share, Customers and Service Cost.

However, the researcher tries to identify which is the most efficient company in the JTI through the indicators of financial performance according to the given accounting and financial data.
The table below shows the summary of the sort order for all companies before and after applying the LRIC model. Where number one indicates the most efficient and number three indicates the most inefficient.

**Table 74: Financial Performance Summary (2006-2012) Ex ante and Ex Post**

<table>
<thead>
<tr>
<th>Indicators/Firms</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ex Ante</td>
<td>Ex Post</td>
<td>Ex Ante</td>
</tr>
<tr>
<td>ROE</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>ROA</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>ROS</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>GPM</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

Looking at table 74, we can see some reverses in relevant performance post LRIC as compared to pre LRIC. For example, in the case of Orange and Umniah, Orange has, relatively speaking, become number one in terms of ROS, whereas, Umniah’s ROS has fallen to number three and a similar result for the GPM indicator.

It can be seen that Orange is the most efficient company in the JTI before and after applying the LRIC model according to the ROE financial performance indicator as shown in the table. While, Umniah has occupied the third rank after Zain for the period after applying the LRIC model and Zain occupied the third rank after Umniah for the period before applying the LRIC model in the JTI.

On the other hand, Zain is the most efficient company in the JTI both before and after applying the LRIC model according to the ROA financial performance indicator as seen in the table. While, Umniah has ranked third during the whole period (2006-2012).

However, it can be noted that the most efficient company according to the ROS indicator of financial performance is Umniah for the period before applying the LRIC model, and in contrast, Orange is the most efficient in the period after applying the LRIC model, while Zain is ranked second for the whole period (2006-2012). In contrast, Orange has
occupied the third rank for the period before applying LRIC and Umniah has occupied the third rank for the period after applying the LRIC model in the JTI.

According to the GPM indicator of financial performance, Zain is the most efficient company in the JTI during the whole period (2006-2012), while Orange is ranked third after Umniah for the period after applying the LRIC model. Umniah has occupied the third rank after Orange for the period before applying the LRIC model in the JTI.

Table 75 shows the summary of the operational performance of all three companies before and after implementing the LRIC model. Where number one indicates the most efficient and three indicates the least efficient.

### Table 75: Operational Performance Summary, 2006-2012 (Ex Ante and Ex Post)

<table>
<thead>
<tr>
<th>Indicators/Firms</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ex Ante</td>
<td>Ex Post</td>
<td>Ex Ante</td>
</tr>
<tr>
<td>Revenue</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>EBITDA</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Net Profit</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>CAPEX</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

It can be seen that Zain is the most efficient before and after applying the LRIC model according to the Revenue and EBITDA operational performance indicators as shown in the table. While, Umniah has occupied the third place after Orange during the whole period (2006-2012) for the same indicators (Revenue and EBITDA).

On the other hand, Zain is the most efficient before and after applying the LRIC model according to the Net Profit operational performance indicator as shown in the table. While, Umniah has occupied the third rank after Orange for the period after applying the LRIC model and Orange has occupied the third rank after Umniah for the period before applying the LRIC model.
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However, it can be noted that the most efficient company according to the CAPEX indicator of operational performance is Orange for the period before applying LRIC model, and Umniah is the most efficient company for the period after applying the LRIC model, while Zain still occupies the third position during the whole period (2006-2012).

Based on the findings table 76 summarised the sort order for all companies before and after introducing the LRIC model. Where number one indicates for the most efficient and number three indicates the most inefficient.

Table 76: Competitive Performance Summary, 2006-2012 (Ex Ante and Ex Post)

<table>
<thead>
<tr>
<th>Competitive Performance Indicators/Firms</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex Ante</td>
<td>Ex Post</td>
<td>Ex Ante</td>
<td>Ex Post</td>
</tr>
<tr>
<td>Customers</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Market Share</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Service Cost</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

* Source: Author’s own table.

It can be seen that Orange is the most efficient before applying the LRIC model according to Customers and Market Share competitive performance indicators as per the table. While, Umniah ranked third after Zain for the period before and after applying the LRIC model and Zain is the most efficient for the period after applying the LRIC model.

On the other hand, Orange is the most efficient before and after applying the LRIC model according to the Service Cost competitive performance indicator as shown in the table. While, Umniah ranked third after Zain for the whole period (2006-2012).

7.3. Summary of Questionnaire Results

In the author’s judgment, published data in the JTI had to be clarified by surveys with managers. These clarifications supported the analysis of the published data. The reader should note that the two data sources were analysed statistically. Published data refers to
the entire population, the three oligopolistic firms. Survey subjects represents a sample of managers, and the significance level of the sample need to be stated.

Table 77 shows the value of the results of the Questionnaire analysis through an indicator of the existence of a relationship between the application of LRIC model and the financial performance for the three companies in Orange, Umniah and Zain for the period 2006-2012.

Table 77: Results from Statistics

<table>
<thead>
<tr>
<th>Subject</th>
<th>Statistics</th>
<th>Relationship between LRIC Model and Financial Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRIC Model</td>
<td>Correlation coefficient</td>
<td>0.905</td>
</tr>
<tr>
<td></td>
<td>The level of significance</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>The size of the sample</td>
<td>51</td>
</tr>
</tbody>
</table>

* Source: the results of the Field Study.

It can be seen from the table that there is a high correlation between the application of the LRIC model and the financial performance for the three companies for the period 2006-2012. Where, the value of the level of significance equals 0.000 and less than 0.05 and the value of the correlation coefficient is equal to 0.905, which indicates a strong and significantly positive correlation between the application of the LRIC model and the financial performance of the Orange, Umniah and Zain.

Table 78 shows the value of the results of the Questionnaire analysis through an indicator of the existence of a relationship between the application of the LRIC model and the operational performance for the three companies Orange, Umniah and Zain for the period 2006-2012.

Table 78: Statistical Results (2)

<table>
<thead>
<tr>
<th>Subject</th>
<th>Statistics</th>
<th>Relationship between LRIC Model and Operational Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRIC Model</td>
<td>correlation coefficient</td>
<td>0.892</td>
</tr>
</tbody>
</table>
The level of significance | 0.000
---|---
The size of the sample | 51

* Source: the results of the Field Study.

As per the above table, the value of the level of significance equals 0.000 and less than 0.05 the value of the correlation coefficient is equal to 0.892, which indicates a strong and significantly positive relationship of the application of the LRIC model on the Jordanian Telecommunications Companies and their Operational Performance.

Table 79 shows the value of the results of the Questionnaire analysis through an indicator of the existence of a relationship between the application of the LRIC model and the competitive performance for the three companies Orange, Umniah and Zain for the period 2006-2012.

**Table 79: Statistical Results (3)**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Statistics</th>
<th>Relationship between LRIC Model and competitive Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRIC Model</td>
<td>correlation coefficient</td>
<td>0.862</td>
</tr>
<tr>
<td></td>
<td>The level of significance</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>The size of the sample</td>
<td>51</td>
</tr>
</tbody>
</table>

* Source: the results of the Field Study.

According to the above table, there is a correlation of 0.862 between the two variables with a significant value of 0.00, which is less than 0.05. Therefore, it can be argued that there is a significant and strong positive relationship between the application of the LRIC models on the Jordanian Telecommunications Companies and their Competitive Performance. Returning to the hypotheses, three parts of the main hypothesis one are supported.

H1a: The application of LRIC models has had a significant impact on the financial performance variables of Orange, Umniah and Zain in the JTI as measured by ROE, ROA, ROS and GPM.
**H₁b**: The application of LRIC models has had a significant impact on the operational performance variables of Orange, Umniah and Zain in the JTI as measured by Revenues, EBITDA, Net Profit and Capex.

**H₁c**: The application of LRIC models has had a significant impact on the competitive performance variables of Orange, Umniah and Zain in the JTI as measured by Market Share, Customers and Service Cost.

### 7.3.1 Summary of the Economic Analysis

One aspect of policy that the regulator is concerned with, is the impact of the LRIC model on the final customer prices (retail prices), or prices per call. Price data in telecommunications is notoriously complicated with many different tariffs. Moreover, the prices that consumers pay per call is considered confidential or commercially sensitive by telecommunications companies.

The author, however, was anxious to get the best estimate/indication possible of the impact of the LRIC model on retail prices. Information about interconnection rates is available. Company sales were extrapolated from market share data, provided by published results of surveys and total sales in the JTI.

The author then approached the impact of LRIC model on retail prices by estimating price elasticity with respect to interconnection charges. It is well known that given demand conditions a reduction in elasticity is associated with a reduction in price or conversely, a reduction in price is associated with a reduction in elasticity. The reader is reminded that the price elasticises calculated by the author are in fact price elasticity with respect to interconnection rates. Generally speaking, these price elasticities have fallen since the LRIC was introduced. The evidence of the effect on retail prices is only inductive. However, survey respondents implied, guardedly, that retail prices have become more competitive. Confidentiality prevented them from citing actual retail prices.

As we said above, telecommunications pricing is complicated. There are many different tariffs, so the retail price changes the author has inferred are averages.

The author has referred to the complexities of the telecommunications pricing, a further source of complexity is that prices charged to customers are to some extent individually
negotiated. Therefore, telecommunications companies are careful to conceal differences in prices charged to very similar customers. Again, circumstantially, the author can confirm that this is the case, indicating better deals for some customers. There are negative effects on customers of discriminatory pricing by companies in a monopoly, or in the case of the JTI a highly oligopolised industry.

The author thus made the bold assumption that lower elasticity with respect to interconnection prices indicated lower elasticity with respect to retail prices. Hence, a fall in retail prices.

Observing table 80 the picture of elasticity is rather mixed and indistinct, the most pronounced fall in elasticity (with the exception 2009, the year of the introduction of LRIC model) is in Umniah. Orange and Zain demonstrate a less defined declining trend. Note however, that when comparing 2008 with 2012 there was a consistent and quite marked reduction in elasticity numbers. In conclusion, there is a positive indication of better deals for customers. However, the author is aware of the bold assumptions necessary to derive this implication and hopes that the discussion has been sufficiently transparent for the reader to make his or her judgement.

### Table 80: The Elasticity of Demand during the Period of Study for Each Company

<table>
<thead>
<tr>
<th>Years</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange</td>
<td>4.480013</td>
<td>4.362873</td>
<td>1.247776</td>
<td>0.880537</td>
<td>2.810819</td>
<td>1.789135</td>
<td>0.038047</td>
</tr>
<tr>
<td>Umniah</td>
<td>5.87028</td>
<td>4.967679</td>
<td>1.705226</td>
<td>2.330758</td>
<td>1.104651</td>
<td>0.879009</td>
<td>0.340602</td>
</tr>
<tr>
<td>Zain</td>
<td>1.785849</td>
<td>2.914082</td>
<td>0.796293</td>
<td>0.581445</td>
<td>1.397691</td>
<td>1.812619</td>
<td>0.088053</td>
</tr>
</tbody>
</table>

*Elasticity = \[ \% \Delta \text{ in Traffic} / \% \Delta \text{ in Rate} \]*

**Source:** Author’s own table.

The figure also shows the Prices of Elasticity of Demand during the period of study.
As illustrated in table 80 and figure 57, before using the LRIC model, there is a noticeable decrease in the Elasticity of Demand for Orange and Umniah, with amounts greater than one for the years 2006-2008. Zain also had a decrease in the Elasticity of Demand, but less than one for the years 2006-2008.

This figure also shows the Elasticity of Demand for each of Orange, Umniah and Zain after using the LRIC model. It was found that there is a continues decrease in these figures of Elasticity of Demand for Orange and Zain, and slight but continual decrease for Umniah during the period 2010-2012. However, all these figures of Elasticity of Demand for the three companies are less than one.

Generally, the elasticity of demand before applying the LRIC model is greater than one, and this necessarily means that the demand on the telecommunications services is a relatively elastic demand. In other words, for instance: if any company reduced the prices of its telecommunications services, other companies will lose more subscribers as customers switch provider, or vice versa if any company increased prices the other companies will receive more subscribers.

The elasticity of demand after applying the LRIC model is generally less than one, and this necessarily means that the demand on the telecommunications services is a relatively
in-elastic demand. In other words: if a company reduced the price of its services, the customers will not respond to this reduction by joining another company and vice versa. However, the researcher tries to identify which is the most efficient company in the JTI through using the elasticity of demand according to economic data. Table 81 shows the summary of the elasticity of demand for the three companies before and after using the LRIC model. Where the number one indicates for the most efficient and three indicates the most inefficient.

**Table 79: Economic Analysis - The Elasticity of Demand for each company - Summary**

<table>
<thead>
<tr>
<th>Ranking of Price Elasticity</th>
<th>Orange</th>
<th>Umniah</th>
<th>Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ex Ante</td>
<td>Ex Post</td>
<td>Ex Ante</td>
</tr>
<tr>
<td>Elasticity of Demand</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

**Source: Author’s own table.**

It can be seen that Umniah is the most efficient before and after applying the LRIC model according to the elasticity of demand as an indicator of economic efficiency measure as shown in the table. While, Zain has occupied the third position after Orange for the period before applying LRIC model and Orange is third for the period after applying LRIC model.
7.3.2 Elasticity of Substitution (Cross Elasticity)

We now consider inter-firm competition between the incumbents Orange, Umniah and Zain. One indicated measure is cross elasticity, defined as responsiveness of sales by company X with respect to a change in price of company Y (both in percentage terms). Also note that the cross elasticity is not symmetric. As the previous tables have demonstrated the cross elasticity of Y with respect to X is not the same as the cross elasticity of X with respect to Y.

No clear picture of inter-firm competition appears on the tables (82+83+84). Generally, the sign is expected to be positive indicating inter-firm competition, but the values were weak especially in 2012, where in all cases except (Umniah/Zain) cross elasticities are substantially below 0.6.

Clearly one aspect of competitive efficiency in the JTI is the weak evidence for inter-firm competition. It appears to be negligible. Thus, in addition to possible price discrimination noted above, there is evidence of non-price competition being the dominant strategy in the JTI. Non-price competition includes advertising, promotion, public relation and other selling costs, which does not bode well for the customers, the question arises as to how this reconciles with falling service costs noted earlier, for example ‘is customer service being sacrificed to non-price competition?’.

Table 80: The elasticity of Substitution during the Period of the Study - Orange/Umniah and Zain

<table>
<thead>
<tr>
<th>Elasticity Of Substitution For Orange/(Umniah and Zain)</th>
<th>Years</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elasticity Of Substitution For Orange/Umniah</td>
<td></td>
<td>4.577619</td>
<td>3.38352</td>
<td>0.642015</td>
<td>1.985817</td>
<td>2.179753</td>
<td>1.339653</td>
<td>0.018903</td>
</tr>
<tr>
<td>Elasticity Of Substitution For Orange/Zain</td>
<td></td>
<td>4.486477</td>
<td>5.219199</td>
<td>1.088095</td>
<td>1.1807</td>
<td>2.849245</td>
<td>1.81673</td>
<td>0.099363</td>
</tr>
</tbody>
</table>

* Elasticity of Substitution for Orange = [ %Δ in Traffic (Orange) / % Δ in Rate (Umniah and Zain) ]

** Source: Author’s own table.
The figure also shows the Prices of Elasticity of Substitution for Orange during the period of study.

**Figure 58: The Elasticity of Substitution for Orange During the Study Period**

![Graph showing the Elasticity of Substitution for Orange during the period 2005-2013. The x-axis represents the years 2005 to 2013, and the y-axis represents the Elasticity of Substitution values. The graph shows a decrease in Elasticity for Orange/Umniah and Orange/Zain.](image)

**Source:** Author's own figure.

According to table 82 and figure 58 the Elasticity of Substitution for Orange/ Umniah and Zain before applying the LRIC model shows a noticeable decrease in the Elasticity of Substitution with an amount less than one for the years 2006-2008. The Elasticity of Substitution for the Orange/Zain Company also decreased, but greater than one for the years 2006-2008.

This figure also shows the Elasticity of Substitution for Orange/Umniah and Zain after applying the LRIC model. As per the figure, there is a continued decrease in Elasticity of Substitution for Orange/Umniah and Zain for the period 2010-2012. However, all these figures of Elasticity of Substitution for the three companies is less than one.

Generally, the elasticity of demand before applying the LRIC model is greater than one, and this necessarily means that the demand on the telecommunications services is a relatively elastic demand. In other words: if any company reduced the prices of its services, other companies will lose subscribers as those customers join the company that reduced the price.

The elasticity of demand after applying the LRIC model is in generally less than one, and this means that the demand on the telecommunications services is a relatively inelastic demand. In other words: if any company reduced the prices of its telecommunications services, the customers will not respond to this reduction by joining another company and vice versa. The reason for this is that the telecommunications services price is calculated...
based on the LRIC model are in general similar to each other. While the telecommunications services price before applying the LRIC model were quite different. However, the researcher tried to identify the most efficient company in the JTI through using the elasticity of demand according to the economic data. Table 83 shows the summary of the elasticity of substitution for Orange/Umniah and Zain before and after using the LRIC model. Where the number one indicates the most efficient and number three indicates the most inefficient.

**Table 81: Economic Analysis - The Elasticity of Substitution for Orange/Umniah and Zain - Summary**

<table>
<thead>
<tr>
<th>Elasticity of Substitution For Orange/(Umniah and Zain)</th>
<th>Orange/Umniah</th>
<th>Orange/ Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex Ante</td>
<td>Ex Post</td>
<td>Ex Ante</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

**Source: Author’s own table.**

According to the elasticity of substitutions indicator of the economic efficiency measures, Orange/Zain is the most efficient company in the JTI for the period before and after applying the LRIC model, while Orange/Umniah has occupied the second rank during the whole period (2006-2012).

**Table 82: The Elasticity of Substitution Umniah/Orange and Zain**

<table>
<thead>
<tr>
<th>Elasticity Of Substitution For Umniah/(Orange and Zain)</th>
<th>Years</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elasticity Of Substitution For Umniah/Orange</td>
<td></td>
<td>5.744771</td>
<td>6.405909</td>
<td>3.314134</td>
<td>1.033507</td>
<td>1.424459</td>
<td>1.173913</td>
<td>0.685931</td>
</tr>
<tr>
<td>Elasticity Of Substitution For Umniah/Zain</td>
<td></td>
<td>5.753366</td>
<td>7.66295</td>
<td>2.890059</td>
<td>1.385862</td>
<td>1.443904</td>
<td>1.19204</td>
<td>1.790325</td>
</tr>
</tbody>
</table>

* Elasticity of Substitution for Umniah = \[ \% \Delta \text{ in Traffic (Umniah)} / \% \Delta \text{ in Rate (Orange and Zain)} \]  

**Source: Author’s own table.**
The figure shows the Price of Elasticity of Substitution for Umniah during the period of study.

**Figure 59: The Elasticity of Substitution for Umniah During the Study Period**

As per table 84 and figure 59, before applying the LRIC model, there is a noticeable decrease in the Elasticity of Substitution of Umniah/Orange and Zain for the years 2006-2008. However, all of these figures of Elasticity of Substitution for the three companies are less than one.

This figure also shows the Elasticity of Substitution for Umniah/Zain after applying the LRIC model. According to the figure, there is a noticeable increase in the Elasticity of Substitution for Umniah/Zain with an amount of greater than one for the years 2010-2012. In contrast, the Elasticity of Substitution for Umniah/Orange decreased, with an amount of less than one for the years 2010-2012.

Accordingly, the elasticity of demand before applying the LRIC model is greater than one, and this means that the demand on the telecommunications services is a relatively elastic demand. On the other hand, the elasticity of demand after applying the LRIC model is in generally less than one, and this means that the demand on the telecommunications services is a relatively inelastic demand.

Table 85 shows the summary of the elasticity of substitution for Umniah/Orange and Zain before and after using the LRIC model.
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Table 83: Economic Analysis - The Elasticity of Substitution of Umniah/Orange and Zain - Summary

<table>
<thead>
<tr>
<th>Elasticity of Substitution For Umniah/(Orange and Zain)</th>
<th>Umniah/Orange</th>
<th>Umniah/Zain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ex Ante</td>
<td>Ex Post</td>
</tr>
<tr>
<td>Elasticity of Substitution For Umniah/(Orange and Zain)</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

** Source: Author’s own table.**

According to the elasticity of substitutions indicator of the economic efficiency measures, Umniah/Orange is the most efficient company in the JTI for the period before applying LRIC model. On the other hand, Umniah/Zain are the most efficient for the period after applying the LRIC model in the JTI.

Table 84: The Elasticity of Substitution Zain/Orange and Umniah during the Period of Study

<table>
<thead>
<tr>
<th>Elasticity Of Substitution For Zain/(Orange and Umniah)</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elasticity Of Substitution For Zain/Orange</td>
<td>1.783268</td>
<td>2.436015</td>
<td>0.913151</td>
<td>0.433625</td>
<td>1.37884</td>
<td>1.785045</td>
<td>0.033749</td>
</tr>
<tr>
<td>Elasticity Of Substitution For Zain/Umniah</td>
<td>1.822217</td>
<td>1.889122</td>
<td>0.469849</td>
<td>0.97795</td>
<td>1.069251</td>
<td>1.336613</td>
<td>0.016758</td>
</tr>
</tbody>
</table>

* Elasticity of Substitution for Zain = [ % Δ in Traffic (Zain) / % Δ in Rate (Orange and Umniah) ]

** Source: Author’s own table.**

The figure also presents the Prices of Elasticity of Substitution for Zain during the period of study.
Figure 60: The Elasticity of Substitution for Zain during the Period of Study

![Graph showing the Elasticity of Substitution for Zain](image)

**Source:** Author’s own figure.

Table 86 and figure 60 explain that there is a noticeable decrease in the Elasticity of Substitution for Zain/Orange and Umniah for the years 2006-2008 before applying the LRIC model. However, all of these figures of Elasticity of Substitution for the three companies are less than one.

After applying the LRIC model, the decrease of Elasticity of Substitution for Zain/Orange and Umniah continued until 2012. All these figures of Elasticity of Substitution for the three companies are also less than one.

Accordingly, the elasticity of demand before applying the LRIC model is greater than one, and this necessarily means that the demand on the telecommunications services is a relatively elastic demand. However, the elasticity of demand after applying LRIC model is in generally less than one, meaning that the demand on the telecommunications services is a relatively inelastic demand.

Table 87 shows the summary of the elasticity of substitution for Zain/Umniah and Orange before and after using the LRIC model. Where the one indicates for the most efficient and three indicate the most inefficient.
Table 85: Economic Analysis - The Elasticity of Substitution for Zain/Orange and Umniah - Summary

<table>
<thead>
<tr>
<th>Elasticity of Substitution For Zain, Umniah and Orange</th>
<th>Zain / Orange</th>
<th>Zain / Umniah</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ex Ante</td>
<td>Ex Post</td>
</tr>
<tr>
<td>Elasticity of Substitution For Zain / (Umniah and Orange)</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**Source: Author’s own table.**

According to the elasticity of substitutions indicator of the economic efficiency measures, Zain/Orange is the most efficient company in the JTI for the period before applying LRIC model, while Zain/Umniah is second during the whole period (2006-2012).

### 7.4 Heat Maps and the Correlations between Efficiency Metrics

According to the third and fourth aim of this research study, which is to design an efficiency model that includes the essential factors that impact the JTI following the application of the LRIC model. The researcher has designed a model, which includes efficiency metrics, which are used to measuring the impact of the application of the LRIC model on the efficiency of the JTI, these efficiency metrics are namely: ROE, ROA, ROS, GPM, EBITDA, Net Profit, Revenue and CAPEX.

The researcher has calculated the correlation coefficient between those metrics. However, those factors have been used previously as management accounting measures to identify the impact of the application of the LRIC model on the efficiency of the firm’s performances in terms of financial, operational and competitive performance through using comparisons between firms in one hand (cross sectional) and entire firms (time series). While now the researcher has formulated a new and second hypothesis for the purpose of achieving this particular aim.
Second Main Hypothesis

**H₂**: There is a significant relationship between the performance variables in the correlation matrix.

This hypothesis derives a new analysis method, which is the heat map analysis method. Moreover, this type has been adopted by the researcher because the calculated correlations between those metrics involve some positive and negative figures, so, the heat map analysis method is one of the more popular ways to present these kinds of figures (positive and negative). Where, the researcher has used the dark red and rose colours as indicator of the positive figures and dark blue and light blue to represent negative figures.

7.4.1 Heat Maps and the Correlations between Efficiency Metrics for Umniah

Table below shows the heat map of efficiency metrics for Umniah for the whole period 2006-2012:

<table>
<thead>
<tr>
<th>Efficiency Metrics of Umniah company</th>
<th>ROE</th>
<th>ROA</th>
<th>ROS</th>
<th>GPM</th>
<th>EBITDA</th>
<th>Net Profit</th>
<th>Revenue</th>
<th>CAPEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROE</td>
<td>1</td>
<td>0.818</td>
<td>0.846</td>
<td>0.902</td>
<td>0.822</td>
<td>0.781</td>
<td>-0.37</td>
<td>-0.649</td>
</tr>
<tr>
<td>ROA</td>
<td>0.818</td>
<td>1</td>
<td>0.821</td>
<td>0.551</td>
<td>0.449</td>
<td>0.452</td>
<td>-0.689</td>
<td>-0.797</td>
</tr>
<tr>
<td>ROS</td>
<td>0.846</td>
<td>0.821</td>
<td>1</td>
<td>0.684</td>
<td>0.461</td>
<td>0.643</td>
<td>-0.513</td>
<td>-0.832</td>
</tr>
<tr>
<td>GPM</td>
<td>0.902</td>
<td>0.551</td>
<td>0.684</td>
<td>1</td>
<td>0.818</td>
<td>0.73</td>
<td>-0.214</td>
<td>-0.312</td>
</tr>
<tr>
<td>EBITDA</td>
<td>0.822</td>
<td>0.449</td>
<td>0.461</td>
<td>0.818</td>
<td>1</td>
<td>0.872</td>
<td>0.164</td>
<td>-0.313</td>
</tr>
<tr>
<td>Net Profit</td>
<td>0.781</td>
<td>0.452</td>
<td>0.643</td>
<td>0.73</td>
<td>0.872</td>
<td>1</td>
<td>0.235</td>
<td>-0.535</td>
</tr>
<tr>
<td>Revenue</td>
<td>-0.37</td>
<td>-0.689</td>
<td>-0.513</td>
<td>-0.214</td>
<td>0.164</td>
<td>0.235</td>
<td>1</td>
<td>0.457</td>
</tr>
<tr>
<td>CAPEX</td>
<td>-</td>
<td>-0.797</td>
<td>-0.832</td>
<td>-0.312</td>
<td>-0.313</td>
<td>-0.535</td>
<td>0.457</td>
<td>1</td>
</tr>
</tbody>
</table>

It can be seen clearly that generally there is a high correlation between efficiency metrics for Umniah during the period 2006-2012, except the last two efficiency metrics, Revenue and CAPEX, both have a negative correlation with the other efficiency metrics.
Nevertheless, it can be said that there is a high positive correlation between most of the efficiency metrics for Umniah during the period 2006-2012. It can be derived that these factors are moving together in the same direction, this mean that these factors can be called a vector efficiency metrics. Consequently, this high positive correlation expresses high efficiency in Umniah's performance during the period 2006-2012, in terms of financial, operational and competitive performance.

Accordingly, the table helps prove the second hypothesis:

\[ H_2: \text{There is a significant relationship between the performance variables in the correlation matrix.} \]

However, the purpose of the research is to look deeply into what happened in the two periods; before and after applying the LRIC model. Therefore, the table below shows the heat map of the efficiency metrics for Umniah for the period 2006-2008, which is before applying the LRIC model.

**Table 87: Heat Map - The Correlation between the Efficiency Metrics for Umniah in the JTI for 2006-2012**

<table>
<thead>
<tr>
<th>Efficiency Metrics of Umniah company 2006-2008</th>
<th>ROE</th>
<th>ROA</th>
<th>ROS</th>
<th>GPM</th>
<th>CAPEX</th>
<th>EBITDA</th>
<th>Net Profit</th>
<th>Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROE</td>
<td>1</td>
<td>0.934</td>
<td>0.462</td>
<td>0.48</td>
<td>0.298</td>
<td>-0.563</td>
<td>-0.995</td>
<td>-0.1</td>
</tr>
<tr>
<td>ROA</td>
<td>0.93</td>
<td>4</td>
<td>1</td>
<td>0.14</td>
<td>-0.062</td>
<td>-0.232</td>
<td>-0.965</td>
<td>-0.936</td>
</tr>
<tr>
<td>ROS</td>
<td>0.46</td>
<td>2</td>
<td>0.116</td>
<td>0.1</td>
<td>0.984</td>
<td>-0.993</td>
<td>-0.374</td>
<td>-0.459</td>
</tr>
<tr>
<td>GPM</td>
<td>0.48</td>
<td>9</td>
<td>0.147</td>
<td>1</td>
<td>0.978</td>
<td>-0.996</td>
<td>-0.403</td>
<td>-0.486</td>
</tr>
<tr>
<td>CAPEX</td>
<td>0.29</td>
<td>8</td>
<td>-</td>
<td>0.984</td>
<td>0.97</td>
<td>1</td>
<td>-0.957</td>
<td>-0.204</td>
</tr>
<tr>
<td>EBITDA</td>
<td>-</td>
<td>0.56</td>
<td>0.232</td>
<td>-</td>
<td>0.99</td>
<td>-0.957</td>
<td>1</td>
<td>0.48</td>
</tr>
<tr>
<td>Net Profit</td>
<td>-</td>
<td>0.99</td>
<td>0.965</td>
<td>-</td>
<td>0.40</td>
<td>-0.204</td>
<td>0.48</td>
<td>1</td>
</tr>
<tr>
<td>Revenue</td>
<td>-0.1</td>
<td>0.936</td>
<td>0.459</td>
<td>-</td>
<td>0.48</td>
<td>-0.294</td>
<td>0.56</td>
<td>0.996</td>
</tr>
</tbody>
</table>
According to the heat map above, it can be noted that in general, there is a high and positive correlation between the efficiency metrics ROE, ROA, ROS, CAPEX and GPM and also, there is a high negative correlation between the efficiency metrics EBITDA, Revenue and Net Profit. Accordingly, it can be said that the efficiency metrics of Umniah for the period 2006-2008 can be divided into two main groups, where both have a high positive correlation. The first group involves the efficiency metrics ROE, ROA, ROS, CAPEX and GPM and suggests these factors are moving together in the same direction, this means that these factors can be called a vector efficiency metrics. While the second group of efficiency metrics (EBITDA, Revenue and Net Profit) suggest these factors are moving together in the same direction, this means that these factors can be called a vector efficiency metrics as well, but separately of the first group and this can be clearly seen in the blue colour (negative correlation) between the main two groups as shown in the heat map above.

Table 88: Heat Map - The Correlations between the Efficiency Metrics for Umniah Company in the JTI over the Period of 2010-2012

<table>
<thead>
<tr>
<th>Correlation</th>
<th>ROE</th>
<th>ROA</th>
<th>ROS</th>
<th>GPM</th>
<th>Revenue</th>
<th>CAPEX</th>
<th>Net Profit</th>
<th>EBITDA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROE</td>
<td>1</td>
<td>0.749</td>
<td>0.758</td>
<td>0.965</td>
<td>0.965</td>
<td>0.861</td>
<td>0.968</td>
<td>0.1</td>
</tr>
<tr>
<td>ROA</td>
<td>0.749</td>
<td>1</td>
<td>0.1</td>
<td>0.557</td>
<td>0.55</td>
<td>0.309</td>
<td>0.56</td>
<td>0.73</td>
</tr>
<tr>
<td>ROS</td>
<td>0.758</td>
<td>0.1</td>
<td>1</td>
<td>0.568</td>
<td>0.561</td>
<td>0.32</td>
<td>0.571</td>
<td>0.739</td>
</tr>
<tr>
<td>GPM</td>
<td>0.965</td>
<td>0.557</td>
<td>0.561</td>
<td>1</td>
<td>0.1</td>
<td>0.962</td>
<td>0.1</td>
<td>0.974</td>
</tr>
<tr>
<td>Revenue</td>
<td>0.965</td>
<td>0.55</td>
<td>0.561</td>
<td>0.1</td>
<td>1</td>
<td>0.964</td>
<td>0.1</td>
<td>0.972</td>
</tr>
<tr>
<td>CAPEX</td>
<td>0.84</td>
<td>0.309</td>
<td>0.321</td>
<td>0.962</td>
<td>0.964</td>
<td>1</td>
<td>0.961</td>
<td>0.875</td>
</tr>
<tr>
<td>Net Profit</td>
<td>0.968</td>
<td>0.56</td>
<td>0.571</td>
<td>0.1</td>
<td>0.1</td>
<td>0.961</td>
<td>1</td>
<td>0.975</td>
</tr>
<tr>
<td>EBITDA</td>
<td>0.1</td>
<td>0.73</td>
<td>0.739</td>
<td>0.974</td>
<td>0.972</td>
<td>0.875</td>
<td>0.975</td>
<td>1</td>
</tr>
</tbody>
</table>

In conclusion, the high positive correlation between efficiency metrics for each group separately and also the high negative correlation between the efficiency metrics all together can express low efficiency in Umniah's performance during the period 2006-
2008, in terms of financial, operational and competitive performance. In other words, the performance of Umniah was inefficient for the period 2006-2008 (before applying the LRIC model in the JTI).

In contrast, it can clearly be seen that the efficiency metrics for Umniah for the period after applying the LRIC model in the JTI have a positive correlation with each other. Table 90 shows the heat map of the efficiency metrics for Umniah company for the period 2010-2012 after applying the LRIC model.

According to the heat map, in general there is a high positive correlation between all the efficiency metrics ROE, ROA, ROS, Capex, GPM, EBITDA, Revenue and Net Profit. Thus, it can be said that the efficiency metrics for Umniah for the period 2010-2012 can be seen moving together in the same direction, this means that these factors can be called vector efficiency metrics as shown in the red colour (positive correlation) between all the efficiency metrics for Umniah.

The high positive correlation between all efficiency metrics together expresses Umniah's performance during the period 2010-2012 was very high and positive, in terms of financial, operational and competitive performance. In other words, the performance of Umniah company was an efficient for the period of 2010-2012 (after applying the LRIC model in the JTI).

7.4.2 Heat Maps and The Correlations Between The Efficiency Metrics For Orange

Table below shows the heat map of efficiency metrics for Orange for the whole period 2006-2012.

Table 89: Heat Map - The Correlation between the Efficiency Metrics for Orange in the JTI for the period 2006-2012

<table>
<thead>
<tr>
<th>Efficiency Metrics of Orange company</th>
<th>Correlation</th>
<th>ROE</th>
<th>ROA</th>
<th>CAPEX</th>
<th>EBITDA</th>
<th>Net Profit</th>
<th>GPM</th>
<th>ROS</th>
<th>Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROE</td>
<td>1</td>
<td>0.822</td>
<td>0.744</td>
<td>0.784</td>
<td>0.805</td>
<td>0.005</td>
<td>-0.509</td>
<td>-0.361</td>
<td></td>
</tr>
<tr>
<td>ROA</td>
<td>0.822</td>
<td>1</td>
<td>0.879</td>
<td>0.795</td>
<td>0.665</td>
<td>0.495</td>
<td>0.009</td>
<td>-0.723</td>
<td></td>
</tr>
<tr>
<td>CAPEX</td>
<td>0.744</td>
<td>0.879</td>
<td>1</td>
<td>0.782</td>
<td>0.789</td>
<td>0.228</td>
<td>-0.213</td>
<td>-0.526</td>
<td></td>
</tr>
<tr>
<td>EBITDA</td>
<td>0.784</td>
<td>0.795</td>
<td>0.782</td>
<td>1</td>
<td>0.931</td>
<td>0.295</td>
<td>-0.301</td>
<td>-0.53</td>
<td></td>
</tr>
<tr>
<td>Net Profit</td>
<td>0.805</td>
<td>0.665</td>
<td>0.789</td>
<td>0.931</td>
<td>1</td>
<td>-0.057</td>
<td>-0.58</td>
<td>-0.248</td>
<td></td>
</tr>
<tr>
<td>GPM</td>
<td>0.005</td>
<td>0.495</td>
<td>0.228</td>
<td>0.295</td>
<td>-0.057</td>
<td>1</td>
<td>0.747</td>
<td>-0.878</td>
<td></td>
</tr>
<tr>
<td>ROS</td>
<td>-0.509</td>
<td>0.009</td>
<td>-0.213</td>
<td>-0.301</td>
<td>-0.58</td>
<td>0.747</td>
<td>1</td>
<td>-0.381</td>
<td></td>
</tr>
<tr>
<td>Revenue</td>
<td>-0.361</td>
<td>-0.723</td>
<td>-0.526</td>
<td>-0.53</td>
<td>-0.248</td>
<td>-0.878</td>
<td>-0.381</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
It can be seen that generally, there is a high correlation between the efficiency metrics for Orange during the period 2006-2012, except the last two efficiency metrics (Revenue and ROS) both have a negative correlation with the other efficiency metrics.

Nevertheless, it can be said that there is a high positive correlation between most of the efficiency metrics for Orange during the period 2006-2012. These factors are moving together in the same direction, this means that these factors can be called a vector efficiency metric. Consequently, this high positive correlation expresses the high efficiency of Orange's performance during the period 2006-2012, in terms of financial, operational and competitive performance.

Accordingly, the table proves the second hypothesis:

\[ H_2: \text{There is a significant relationship between the performance variables in the correlation matrix.} \]

The table below shows the heat map of the efficiency metrics for Orange for the period 2006-2008, which is before applying the LRIC.

**Table 90: Heat Map - The Correlations between The Efficiency Metrics for Orange in the JTI for the period 2006-2008**

<table>
<thead>
<tr>
<th>Correlation</th>
<th>ROE</th>
<th>ROA</th>
<th>ROS</th>
<th>GPM</th>
<th>Revenue</th>
<th>EBITDA</th>
<th>Net Profit</th>
<th>CAPEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROE</td>
<td>1</td>
<td>0.327</td>
<td>-0.813</td>
<td>-0.848</td>
<td>0.995</td>
<td>0.931</td>
<td>0.992</td>
<td>0.524</td>
</tr>
<tr>
<td>ROA</td>
<td>0.327</td>
<td>1</td>
<td>0.284</td>
<td>0.223</td>
<td>0.23</td>
<td>0.65</td>
<td>0.208</td>
<td>-0.634</td>
</tr>
<tr>
<td>ROS</td>
<td>-0.813</td>
<td>0.284</td>
<td>1</td>
<td>0.998</td>
<td>-0.868</td>
<td>-0.543</td>
<td>-0.879</td>
<td>-0.922</td>
</tr>
<tr>
<td>GPM</td>
<td>-0.848</td>
<td>0.223</td>
<td>0.998</td>
<td>1</td>
<td>-0.867</td>
<td>-0.596</td>
<td>-0.907</td>
<td>-0.896</td>
</tr>
<tr>
<td>Revenue</td>
<td>0.995</td>
<td>0.23</td>
<td>-0.868</td>
<td>-0.897</td>
<td>1</td>
<td>0.889</td>
<td>0.1</td>
<td>0.607</td>
</tr>
<tr>
<td>EBITDA</td>
<td>0.931</td>
<td>0.65</td>
<td>-0.543</td>
<td>-0.596</td>
<td>0.889</td>
<td>1</td>
<td>0.878</td>
<td>0.176</td>
</tr>
<tr>
<td>Net Profit</td>
<td>0.992</td>
<td>0.208</td>
<td>-0.878</td>
<td>-0.907</td>
<td>0.1</td>
<td>0.878</td>
<td>1</td>
<td>0.625</td>
</tr>
<tr>
<td>CAPEX</td>
<td>0.524</td>
<td>-0.634</td>
<td>-0.922</td>
<td>-0.896</td>
<td>0.607</td>
<td>0.176</td>
<td>0.625</td>
<td>1</td>
</tr>
</tbody>
</table>

According to the heat map above, it can be noted that in general there is a high positive correlation between the efficiency metrics ROE, ROA, CAPEX, EBITDA, Net Profit and Revenue and also, there is a high but negative correlation between the efficiency metrics ROS and GPM. Thus, it can be said that the efficiency metrics for Orange for the period 2006-2008 can be divided into two main groups, where both have a high
correlation between them, whether positive or negative. The first group involves the efficiency metrics ROE, ROA, CAPEX, EBITDA, Net Profit and Revenue; these factors are moving together in the same direction, this means that these factors can be called a vector efficiency metric. While the second group of efficiency metrics ROS and GPM are moving together in the same direction, this means that these factors can be called a vector efficiency metric as well, but separately to the first group and this can be clearly seen in the blue colour (negative correlation) as shown in the heat map above.

In conclusion, the high positive correlation between the efficiency metrics for each group separately and also the high negative correlation between the efficiency metrics all together expresses low efficiency for Orange's performance during the period 2006-2008, in terms of financial, operational and competitive performance. In other words, the performance of Orange was inefficient for the period of 2006-2008.

Similarly, it can clearly be seen that the results of efficiency metrics for Orange for the period after applying the LRIC model are similar to the results before applying the LRIC model.

Table below shows the heat map of efficiency metrics for Orange for the period 2010-2012 after applying the LRIC model.

Table 91: Heat Map - The correlation between the Efficiency Metrics for Orange in the JTI for the period 2010-2012

<table>
<thead>
<tr>
<th>Efficiency Metrics of Orange company 2010-2012</th>
<th>ROE</th>
<th>ROA</th>
<th>Revenue</th>
<th>ROS</th>
<th>GPM</th>
<th>EBITDA</th>
<th>Net Profit</th>
<th>CAPEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROE</td>
<td>1</td>
<td>0.1</td>
<td>-0.948</td>
<td>-0.359</td>
<td>0.847</td>
<td>0.464</td>
<td>0.312</td>
<td>0.969</td>
</tr>
<tr>
<td>ROA</td>
<td>0.1</td>
<td>1</td>
<td>-0.94</td>
<td>-0.334</td>
<td>0.832</td>
<td>0.44</td>
<td>0.287</td>
<td>0.962</td>
</tr>
<tr>
<td>Revenue</td>
<td>-0.948</td>
<td>-0.94</td>
<td>1</td>
<td>0.636</td>
<td>-0.972</td>
<td>-0.721</td>
<td>-0.597</td>
<td>-0.998</td>
</tr>
<tr>
<td>ROS</td>
<td>-0.359</td>
<td>-0.334</td>
<td>0.636</td>
<td>1</td>
<td>-0.801</td>
<td>-0.993</td>
<td>-0.999</td>
<td>-0.58</td>
</tr>
<tr>
<td>GPM</td>
<td>0.847</td>
<td>0.832</td>
<td>-0.972</td>
<td>-0.801</td>
<td>1</td>
<td>0.864</td>
<td>0.77</td>
<td>0.952</td>
</tr>
<tr>
<td>EBITDA</td>
<td>0.464</td>
<td>0.44</td>
<td>-0.721</td>
<td>-0.993</td>
<td>0.864</td>
<td>1</td>
<td>0.986</td>
<td>0.67</td>
</tr>
<tr>
<td>Net Profit</td>
<td>0.312</td>
<td>0.287</td>
<td>-0.597</td>
<td>-0.999</td>
<td>0.77</td>
<td>0.986</td>
<td>1</td>
<td>0.539</td>
</tr>
<tr>
<td>CAPEX</td>
<td>0.969</td>
<td>0.962</td>
<td>-0.998</td>
<td>-0.58</td>
<td>0.952</td>
<td>0.67</td>
<td>0.539</td>
<td>1</td>
</tr>
</tbody>
</table>

According to the heat map above, it can be noted that in general, there is a high positive correlation between the particular efficiency metrics ROE, ROA, CAPEX, EBITDA, Net Profit and GPM and also, there is a high but negative correlation between the efficiency metrics ROS and Revenue. It can be said that the efficiency metrics of Orange for the
period 2010-2012 can be divided into two main groups, where both have a high correlation between them, whether positive or negative. The first group involves the efficiency metrics ROE, ROA, CAPEX, EBITDA, Net Profit and GPM these factors are moving together in the same direction, this means that these factors can be called a vector efficiency metrics. While the second group of efficiency metrics ROS and Revenue these factors are moving together in the same direction, this means that these factors can be called a vector efficiency metrics as well, but separately to the first group and this can be clearly seen in the blue colour (negative correlation).

In conclusion, the high positive correlation between the efficiency metrics for each group separately and also the high negative correlation between the efficiency metrics altogether expresses low efficiency of Orange's performance during the period 2010-2012, in terms of financial, operational and competitive performance. In other words, the performance of Orange was inefficient for the period 2010-2012 (before applying the LRIC model in the JTI).

### 7.4.3 Heat Maps and The Correlations Between The Efficiency Metrics For Zain

Table below shows the heat map of efficiency metrics for Zain for the period 2006-2012:

**Table 92: Heat Map - The Correlation between the Efficiency Metrics for Zain in the JTI for the Period 2006-2012**

<table>
<thead>
<tr>
<th>Efficiency Metrics of Zain company</th>
<th>ROE</th>
<th>ROA</th>
<th>ROS</th>
<th>GPM</th>
<th>Revenue</th>
<th>EBITDA</th>
<th>Net Profit</th>
<th>CAPEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROE</td>
<td>1</td>
<td>0.647</td>
<td>0.346</td>
<td>0.038</td>
<td>-0.173</td>
<td>0.352</td>
<td>0.24</td>
<td>-0.088</td>
</tr>
<tr>
<td>ROA</td>
<td>0.647</td>
<td>1</td>
<td>0.593</td>
<td>0.003</td>
<td>0.039</td>
<td>0.287</td>
<td>0.159</td>
<td>-0.463</td>
</tr>
<tr>
<td>ROS</td>
<td>0.346</td>
<td>0.593</td>
<td>1</td>
<td>-0.458</td>
<td>0.338</td>
<td>0.571</td>
<td>0.849</td>
<td>-0.727</td>
</tr>
<tr>
<td>GPM</td>
<td>0.038</td>
<td>0.003</td>
<td>-0.458</td>
<td>1</td>
<td>-0.625</td>
<td>0.052</td>
<td>-0.498</td>
<td>-0.004</td>
</tr>
<tr>
<td>Revenue</td>
<td>-0.173</td>
<td>0.039</td>
<td>0.338</td>
<td>-0.625</td>
<td>1</td>
<td>-0.319</td>
<td>0.268</td>
<td>0.258</td>
</tr>
<tr>
<td>EBITDA</td>
<td>0.352</td>
<td>0.287</td>
<td>0.571</td>
<td>0.052</td>
<td>-0.319</td>
<td>1</td>
<td>0.493</td>
<td>-0.612</td>
</tr>
<tr>
<td>Net Profit</td>
<td>0.24</td>
<td>0.159</td>
<td>0.849</td>
<td>-0.498</td>
<td>0.268</td>
<td>0.493</td>
<td>1</td>
<td>-0.603</td>
</tr>
<tr>
<td>CAPEX</td>
<td>-0.088</td>
<td>-0.463</td>
<td>-0.727</td>
<td>-0.004</td>
<td>0.258</td>
<td>-0.612</td>
<td>-0.603</td>
<td>1</td>
</tr>
</tbody>
</table>

It can clearly be seen that generally there is a high correlation between efficiency metrics for Zain during the period 2006-2012, except the last two efficiency metrics (Capex), which has a negative correlation with the other efficiency metrics.
Nevertheless, it can be said that there is a high positive correlation between most of the efficiency metrics for Zain during the period 2006-2012. These factors are moving together in the same direction, this means that these factors can be called vector efficiency metrics. Consequently, this high positive correlation expresses the high efficiency of Zain's performance during the period 2006-2012, in terms of financial, operational and competitive performance.

Accordingly, the table proves the second hypothesis:

\[ H_2: \text{There is a significant relationship between the performance variables in the correlation matrix.} \]

The table below shows the heat map of efficiency metrics for Zain for the period 2006-2008, which is before applying the LRIC model.

### Table 93: Heat Map - The Correlation between the Efficiency Metrics for Zain in the JTI for the period 2006-2008

<table>
<thead>
<tr>
<th>Efficiency Metrics of Zain company pre 2006-2008</th>
<th>ROE</th>
<th>ROA</th>
<th>ROS</th>
<th>Net Profit</th>
<th>Revenue</th>
<th>EBITDA</th>
<th>GPM</th>
<th>CAPEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROE</td>
<td>1</td>
<td>0.859</td>
<td>0.949</td>
<td>0.968</td>
<td>0.997</td>
<td>0.992</td>
<td>-0.445</td>
<td>-0.854</td>
</tr>
<tr>
<td>ROA</td>
<td>0.859</td>
<td>1</td>
<td>0.977</td>
<td>0.96</td>
<td>0.814</td>
<td>0.786</td>
<td>-0.841</td>
<td>-0.1</td>
</tr>
<tr>
<td>ROS</td>
<td>0.949</td>
<td>0.977</td>
<td>1</td>
<td>0.998</td>
<td>0.92</td>
<td>0.9</td>
<td>-0.705</td>
<td>-0.974</td>
</tr>
<tr>
<td>Net Profit</td>
<td>0.968</td>
<td>0.96</td>
<td>0.998</td>
<td>1</td>
<td>0.944</td>
<td>0.927</td>
<td>-0.656</td>
<td>-0.957</td>
</tr>
<tr>
<td>Revenue</td>
<td>0.997</td>
<td>0.814</td>
<td>0.92</td>
<td>0.944</td>
<td>1</td>
<td>0.999</td>
<td>-0.37</td>
<td>-0.808</td>
</tr>
<tr>
<td>EBITDA</td>
<td>0.992</td>
<td>0.786</td>
<td>0.9</td>
<td>0.927</td>
<td>0.999</td>
<td>1</td>
<td>-0.325</td>
<td>-0.779</td>
</tr>
<tr>
<td>GPM</td>
<td>-0.445</td>
<td>-0.841</td>
<td>-0.705</td>
<td>-0.656</td>
<td>-0.37</td>
<td>-0.325</td>
<td>1</td>
<td>0.846</td>
</tr>
<tr>
<td>CAPEX</td>
<td>-0.854</td>
<td>-0.1</td>
<td>-0.974</td>
<td>-0.957</td>
<td>-0.808</td>
<td>-0.779</td>
<td>0.846</td>
<td>1</td>
</tr>
</tbody>
</table>

According to the heat map above, it can be noted that in general, there is a high positive correlation between the particular efficiency metrics ROE, ROA, ROS, EBITDA, Net Profit and Revenue and also, there is a high negative correlation between the efficiency metrics CAPEX and GPM. Accordingly, it can be said that the efficiency metrics for Zain for the period 2006-2008 can be divided into two main groups, where both have a high correlation between them, whether positive or negative. The first group involves the
efficiency metrics ROE, ROA, ROS, EBITDA, Net Profit and Revenue these factors are moving to gather in the same direction, this means that these factors can be called a vector efficiency metrics. While the second group of efficiency metrics CAPEX and GPM are moving together in the same direction, this means that these factors can be called a vector efficiency metrics as well, but separate to the first group and this can be clearly seen in the blue colour (negative correlation).

In conclusion, the high positive correlation between the efficiency metrics in general indicates that Zain's performance during the period 2006-2008 is efficient, in terms of financial, operational and competitive performance. In other words, the performance of Zain was efficient for the period 2006-2008 (before applying the LRIC model).

The results of efficiency metrics for Zain for the period after applying the LRIC model imply the contrary.

Table below shows the heat map of efficiency metrics for Zain for the period 2010-2012 after applying the LRIC model in the JTI.

**Table 94: Heat Map - The Correlation between the Efficiency Metrics for Zain in the JTI for the period 2010-2012**

<table>
<thead>
<tr>
<th>Correlation</th>
<th>ROE</th>
<th>ROS</th>
<th>ROA</th>
<th>CAPEX</th>
<th>Revenue</th>
<th>EBITDA</th>
<th>Net Profit</th>
<th>GPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROE</td>
<td>1</td>
<td>-0.087</td>
<td>0.616</td>
<td>0.886</td>
<td>0.772</td>
<td>-0.907</td>
<td>-0.01</td>
<td>-0.523</td>
</tr>
<tr>
<td>ROS</td>
<td>-0.087</td>
<td>1</td>
<td>-0.838</td>
<td>-0.54</td>
<td>0.566</td>
<td>0.499</td>
<td>0.997</td>
<td>-0.804</td>
</tr>
<tr>
<td>ROA</td>
<td>0.616</td>
<td>-0.838</td>
<td>1</td>
<td>0.912</td>
<td>-0.025</td>
<td>-0.891</td>
<td>-0.794</td>
<td>0.349</td>
</tr>
<tr>
<td>CAPEX</td>
<td>0.886</td>
<td>-0.54</td>
<td>0.912</td>
<td>1</td>
<td>0.388</td>
<td>-0.999</td>
<td>-0.473</td>
<td>-0.067</td>
</tr>
<tr>
<td>Revenue</td>
<td>0.772</td>
<td>0.566</td>
<td>-0.025</td>
<td>0.388</td>
<td>1</td>
<td>-0.433</td>
<td>0.628</td>
<td>-0.946</td>
</tr>
<tr>
<td>EBITDA</td>
<td>-0.907</td>
<td>0.499</td>
<td>-0.891</td>
<td>-0.999</td>
<td>-0.433</td>
<td>1</td>
<td>0.43</td>
<td>0.116</td>
</tr>
<tr>
<td>Net Profit</td>
<td>-0.01</td>
<td>0.997</td>
<td>-0.794</td>
<td>-0.473</td>
<td>0.628</td>
<td>0.43</td>
<td>1</td>
<td>-0.847</td>
</tr>
<tr>
<td>GPM</td>
<td>-0.523</td>
<td>-0.804</td>
<td>0.349</td>
<td>-0.067</td>
<td>-0.946</td>
<td>0.116</td>
<td>-0.847</td>
<td>1</td>
</tr>
</tbody>
</table>

According to the table, in general there is a high negative correlation between all efficiency metrics. It can be said that efficiency metrics for Zain for the period 2010-2012
are moving in a different direction, this means that these factors cannot be called vector efficiency metrics.

In conclusion, the high negative correlation between the efficiency metrics expresses low efficiency in Umniah's performance during the period 2010-2012, in terms of financial, operational and competitive performance. In other words, Zain was inefficient for the period of 2010-2012 (after applying the LRIC model in the JTI).

Analysis of the data revealed that adopting LRIC on pricing and costing apparently had significant impacts on performance; and as already mentioned the impact varied between measures; sales data (call traffic/volumes) were extrapolated and suggest some impact on competition and market share. Correlations are not entirely of the order that theory would predict, one suggestion emerges from correlation/covariance analysis is that performance and efficiency may be more reliably measured by composite measures than measures independently and that heat mapping comparative data is a useful management tool.

Thus the regulator, concerned with the impact of LRIC, must assess the appropriate cost plus or mark-up, over and above variable cost, from the point of view of; the shareholder, profit; the community, allowance for investment; the potential entrant, price charged by incumbents for fixed assets; the final customer, the size of her or his mobile phone bill; the government, concerned with investment and socio-economic development.

7.5 Research Recommendations

Based on the research objectives and aims as well as the results obtained from the data analysis, the recommendations below are proposed;

- Referring to the analyses on the effect of applying the LRIC model on the financial performance of the Jordanian telecommunications firms, it can be said that there is a relationship (whether negative or positive, but negative in general) between applying the LRIC model on the Jordanian Telecommunications Companies Financial Performance. From the view point of the regulator (TRC), service providers, whether incumbent or new entrants can earn a sufficient profit to cover a reasonable share of their cost of capital (investments). As a result, the
prices of the services provided will be fair and reasonable for consumers. From this viewpoint, the research recommends the continuation of the application of the LRIC model for costing and pricing telecommunications services in the Jordanian telecommunications industry (JTI).

- Referring to the analyses of the effect of applying the LRIC model on the operational performance of the Jordanian telecommunications firms, it can be said that there is a relationship (whether negative or positive, but negative in general) between applying the LRIC model on the Jordanian Telecommunications Companies and operational Performance. Thus, from the viewpoint of the regulator (TRC) services providers, whether incumbent or new entrants, can earn a reasonable and sufficient profit and normal return on capital sufficient to cover a reasonable share of common and fixed costs by using an equal proportionate mark-up (EPMU) approach. Also to cover the cost of new investments which meet the increasing demand for next generation technology. This research, therefore, recommends the ongoing application of the LRIC model for costing and pricing telecommunications services in the JTI.

- Referring to the analyses of the effect of applying the LRIC model on the competitive performance of Jordanian telecommunications firms, it can be said that, there is a relationship (whether negative or positive, but positive in general) between applying the LRIC model and competitive Performance. Therefore, from the viewpoint of the regulator (TRC) the efficiency of prices based on the LRIC model methodology may open the door for new entrants into the industry and also may lead to ensuring that incumbent and new entrants share fixed assets (network elements) with each other as well as encouraging competition. In addition, the efficiency of the LRIC prices will protect consumers’ interests by providing them with new technology at lower prices. Consequently, service providers, whether incumbent or new entrants can earn a reasonable and sufficient profit and normal return on capital sufficient to cover a reasonable share of common and fixed costs by using equal proportionate mark-up (EPMU) approach, and also to cover the cost of their new investments. Thus from this perspective, this research
recommends the long-term application of the LRIC model for costing and pricing telecommunications services in the JTI.

- Economically, the MC rule is an optimal approach. Therefore, the marginal cost is the most efficient pricing method from the viewpoint of economists, which tempts most economists (Kahn, 1988; Mandy, 2002). Thus, this research study recommends continued application of the LRIC model in the JTI initially for the wholesale market until it reaches Zero interconnection rates among the three firms (it should be noted that the interconnections rates in the UK and most European countries are less than €0.01 according to the report of the BEREC (2015), while according to the report published by the TRC in (2014) the interconnections rates are 12.99 JD Fils (1.602 € cent) this means that the wholesale market is fully competitive and ready to tempt more investors and new entrants. However, firms can cover their fixed and sunk costs through focusing more on launching more competitive telecommunication bundles/offers such as the UK and the rest of Europe to tempt more customers into joining their networks thereby; increasing revenue and covering fixed and sunk costs. This is what economists call Marginal Cost Pricing, based on providing an extra unit of customer to make a profit, one more customer will increase the probability of a firm and also cover/mark-up a portion of fixed and sunk costs.

7.6 Research Limitations

- This research may be considered a very useful study, but not without limitations or flaws. Generally, the case-study strategy has limitations because of its nature for instance: a lack of accuracy and it may not provide enough basis on which to generalise the results obtained. This research is not an exception. Moreover, there are some other limitations of this research study related to the timeframe of the fieldwork, where this study is based on a concentrated and comprehensive view of the JTI for the period between 2006 and 2012.

- Due to the scope of the research, this study does not take into account a comparison with other markets, such as fixed line markets in the JTI.
- The LRIC model has been applied in 2009 as a basis to calculate interface prices (interconnection rates) between the operators (Orange, Umniah and Zain). So, the researcher has taken three years before and three years after the introduction of the LRIC model. Thus, a longitudinal case study must be conducted in both a contextual approach and industrial analysis.

- Due to the constraints of the timeframe available for PhD research and also, due to the limit on the maximum length of time for a PhD thesis, this research study focused on achieving the aims and objectives through answering the questions that have been formulated particularly for this research study. According to Dyer and Wilkins (1991:164), fewer contextual visions would be communicated when analysing the multiple and longitudinal case studies. However, to produce a more weighty explanation further in-depth study needs to be completed on multiple case, that would require a longer period of time than that which was available.

“The most critical trade-off facing the researcher in this regard [that is, to undertake comparison within the same organisational field] is between the deep understanding of a particular social setting and the benefits of comparative insights. Thus, the more context a research investigates, the less contextual insight he or she can communicate”. In addition, “Theory that is born of such deep insights will be more accurate and more appropriately tentative because the researcher must take into account the intricacies and the qualification of a particular context” (Van Maanen 1979:615).

- The other limitations of this research were that some of the managers in some firms were inaccessible, especially for the period before applying the LRIC model, some had retired and others had moved on, which is to be expected for those at a higher management level. Thus, the researcher had some difficulties obtaining the opinions and interpretations of the pre LRIC model period.

- Another limitation in conducting and recording the surveys was that managers preferred to fill in a questionnaire rather than be record in surveys, the main reasons behind this were: limited time, the questionnaires can be filled out anywhere anytime, those at managerial level were busy travelling. Nonetheless, it should be noted that, the current managers who filled out the questionnaires had
direct and relevant experience within the context of this research and in fact were considered experts in this particular subject. Finally, the limitations mentioned above may affect the accuracy and depth of the information obtained.

7.7 Future Research

Along with the above research limitations, the suggested possible avenues for future research can be as follows:

- To conduct a comparative case studies of two telecommunications wholesale markets; fixed line and mobile market in the JTI. This would be useful at this research focus more on the wholesale market, especially interconnection services/charges between mobile operators themselves, which is referred to as Business to Business.
- It is therefore, recommended that the following research should focus on the retail market, conducting research such as this would offer a comparison which would be a very useful to obtain in-depth understanding/explanations about the JTI as an entire industry. This would facilitate further generalisation of the results on the JTI.
- Other suggested avenues for future research is repeating this type of study in other developing countries, either focusing on a single country or comparing two or more countries.
- Furthermore, it could also, focusing on a single telecommunications market or compare two telecommunications markets in a single country or multiple countries, especially if they are in a similar environment and operating under the similar circumstances.
- Additionally, a comparative case study could be conducting in a different industry in the same country so long as they are applying the LRIC model in their markets/industries, especially if they are in a similar industrial environment and are operating under the same circumstances, for instance: gas, water, electricity, postal industry or other different utilities.
- This research study has focused on conducting a Business to Business comparative case-study. The retail market is between operators and their customers, which is referred to as Business to Customer. So, the questions that arise are: *is there any relationship between applying the LRIC model and retail prices? What is the impact of applying the LRIC model on the retail prices?*

- This research is concerned with the JTI, particularly the mobile telecommunications services, from this point, the fixed telecommunications service issue needs to be discussed in the further research from the same viewpoint. After that, both results can be combined and generalised to the whole, JTI, whether mobile or fixed line market.

"And your Lord is going to give you, and you will be satisfied" (Al-Quran, Surat Al-Duhaa: verse 5)

"And mankind have not been given of knowledge except a little" (Al-Quran, Surat Isra: verse 85)

"My Lord, increase me in knowledge." (Al-Quran, Surat Taha: verse 114)
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Appendix No (1)

“A Study of the Application of the Long Run Incremental Cost (LRIC) models in the Jordanian Telecommunications Industry (JTI): Performance, Efficiency and Implementation Issues (Case Study on the Jordanian Telecommunications Companies)”

Dear Respondent,

لینـــــن سأَهـي لـِـسُـهور حـِـال اوـبرـكاتـه

Sincerely Greeting,

As the title of this note suggests the attached questionnaire is part of my doctoral research at Cardiff Metropolitan University, carried out under the auspices of the London school of commerce. This research will study the impact of applying the Long Run Incremental Cost (LRIC) models in the Jordanian Telecommunications Industry to determine the factors that affect performance, efficiency and implementation. The adoption of the LRIC model provides the opportunities for the Telecommunications companies, whether incumbent or new entrants to provide their telecommunications services with competitive prices, which are calculated based on the incremental costs taking into account the contribution of the huge amount of the fixed cost compared with the negligible amount of the variable costs.

Your assistance with my research by completing the short questionnaire below would be most valuable and much appreciated. As you will see the questions relate to the application of LRIC models on performance indicators; financial, operational and competitive performance. I’m sure you are well aware of the formal definitions of acronyms used in the questionnaire, but to avoid ambiguity I list them below.
Appendix 1

Table 1-1 presents the formal definitions of acronyms used in the questionnaire

<table>
<thead>
<tr>
<th>Abbreviations</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRIC</td>
<td>Long Run Incremental Cost</td>
</tr>
<tr>
<td>ROA</td>
<td>Return on Assets</td>
</tr>
<tr>
<td>ROE</td>
<td>Return on Equity</td>
</tr>
<tr>
<td>ROI</td>
<td>Return on Investment</td>
</tr>
<tr>
<td>ROS</td>
<td>Return on Sales</td>
</tr>
<tr>
<td>GPM</td>
<td>Gross Profit Margin</td>
</tr>
<tr>
<td>EBITDA</td>
<td>Earnings before Interest, Tax, Depreciation and Amortisation</td>
</tr>
<tr>
<td>Capex</td>
<td>Capital expenditures</td>
</tr>
</tbody>
</table>

Your identity will be anonymous and I will assure you that your responses and company information will be kept in the strictest confidence. I will provide you the results of this research if you indicate your interest. Your participation in this survey will be accepted as your consent.

Thank you in advance for your cooperation and effort in completing this questionnaire.

If you have any questions about the research or how I intend to conduct the study, please contact us.

Director of Study: Professor Robin Matthews  
School of Management, Cardiff Metropolitan University.

Supervisor: Dr. Robert Greenwood  
Cardiff, CF5 2YB

Tel: +44 (0) 292 041 6425

e-mail: rpgreenwood@yahoo.com

e-mail: robindcmatthews@gmail.com

Tel: +44 (0) 7775 985 710
Appendix 1

Abdullah Jwaifel, PhD student.

E-mail: 20035491@cardiffmet.ac.uk

Mobile No: UK - +44 (0) 744 817 3698

Jordan +962 (0) 77 57 47 567

Section I: Personal Information

Please tick one box for each question below.

1- In what age group are you?
   □ 19 – under
   □ 20 – 29
   □ 30 – 39
   □ 40 – 49
   □ 50 – 59
   □ 60+

2- Gender
   □ Male
   □ Female

3- In terms of your current occupation, how would you characterise yourself?
   □ Top management
   □ Middle management
   □ Lower management

4- Describe your occupation or Position
   □ Financial Managers
   □ Cost Accountants
   □ Accounts managers (Chief Accountants)
Appendix 1

☐ Quality Assurance Managers

5- How long have you been in the company? (Years)

☐ 1 – under
☐ 1 – 2
☐ 3 – 5
☐ 5 – 7
☐ 7 – 9
☐ 10+

6- How long have you been aware of the LRIC models?

☐ 1 – under
☐ 1 – 2
☐ 3 – 5
☐ 5 – 7
☐ 7 – 9
☐ 10+
Section II: Financial Performance

Table (2-1)

- This Table in regards of the relationship between the application of the
  LRIC Model and the Financial Performance:

Please TICK your response to the following statements the Table below.

<table>
<thead>
<tr>
<th>S.N</th>
<th>Sentence</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Application of the LRIC model has had a significantly positive effect on the ROE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Application of the LRIC model has had a significantly positive effect on the ROA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Application of the LRIC model has had a significantly positive effect on the ROS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Application of the LRIC model has had a significantly positive effect on the GPM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Table (2-1, a)**

- This Table in regards of assessment the strength impact degree of adapting the LRIC model in the company through the Financial Performance indicators:

Please TICK your response to the following statements the Table below.

<table>
<thead>
<tr>
<th>S.N</th>
<th>Sentence</th>
<th>Very high</th>
<th>High</th>
<th>Moderately</th>
<th>None at all</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The impact of the LRIC model on the ROE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>The impact of the LRIC model on the ROA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>The impact of the LRIC model on the ROS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>The impact of the LRIC model on the GPM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Section III: Operational Performance

Table (3-1)

- This Table in regards of the relationship between the application of the LRIC Model and the Operational Performance:

Please TICK your response to the following statements the Table below.

<table>
<thead>
<tr>
<th>S.N</th>
<th>Sentence</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Application of the LRIC model has had a significantly positive effect on the Revenue</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Application of the LRIC model has had a significantly positive effect on the EBITDA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Application of the LRIC model has had a significantly positive effect on the Net Profit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Application of the LRIC model has had a significantly positive effect on the CAPEX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 1

Table (3-1, a)

- This Table in regards of assessment the strength impact degree of adapting the LRIC model in the company through the Operational Performance indicators:

Please TICK your response to the following statements the Table below.

Table 3-1, a presents the strength impact degree of adapting the LRIC model in the company through the Operational Performance indicators

<table>
<thead>
<tr>
<th>S.N</th>
<th>Sentence</th>
<th>Very high</th>
<th>High</th>
<th>Moderately</th>
<th>None at all</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The impact of the LRIC model on the Revenue</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>The impact of the LRIC model on the EBITDA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>The impact of the LRIC model on the Net Profit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>The impact of the LRIC model on the CAPEX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Section IV: Competitive Performance

Table (4-1)

- This Table in the regards of the relationship between the application of the LRIC Model and the Competitive Performance:

Please TICK your response to the following statements the Table below.

<table>
<thead>
<tr>
<th>S.N</th>
<th>Sentence</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Application of the LRIC model has had a significantly positive effect on the Customers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Application of the LRIC model has had a significantly positive effect on the Market Share</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Application of the LRIC model has had a significantly positive effect on the Service Cost</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This Table in regards of assessment the strength impact degree of adapting the LRIC model in the company through the Competitive Performance indicators: Please TICK your response to the following statements the Table below.

Table 4-1, a presents the strength impact degree of adapting the LRIC model in the company through the Competitive Performance indicators

<table>
<thead>
<tr>
<th>S.N</th>
<th>Sentence</th>
<th>Very high</th>
<th>High</th>
<th>Moderately</th>
<th>None at all</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The impact of the LRIC model on the Customers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>The impact of the LRIC model on the Market Share</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>The impact of the LRIC model on the Service Cost</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Thank you very much for your cooperation
Appendix 2

Publication (1):

Academic Paper Acceptance Letter

Dear Abdullah Mahmoud Yousef Jwairfi, Prof. Robin Matthew, Dr. Robert Greenwood,

It's my pleasure to inform you that, after the peer review, your paper,

The Application of LRIC (Long Run Incremental Cost) Model in the JTI (Jordanian Telecommunication Industry) & its ability to Support the Financial Performance in these companies

has been ACCEPTED with content unaltered to publish with European Journal of Business and Management, ISSN (Paper)2222-1805 ISSN (Online)2222-2839.

In order to fit into the publishing and printing schedule, please re-submit your complete publication package by directly replying this acceptance email within 15 days so we can make your article available online/print in the next issue (usually at the end of each month). If you failed to prepare your complete files on time, the publication of your article might be delayed.

Though the reviewers of the journal already confirmed the quality of your paper's current version, you can still add content to it, such as solidifying the literature review, adding more content in the conclusion, giving more information on your analytical process and giving acknowledgement.

To help the editor of the journal process your final paper quickly, you need to prepare your paper based on the attached "publication_package_instruction.pdf".

Again, thank you for working with IISTE. I believe that our collaboration will help to accelerate the global knowledge creation and sharing one step further. IISTE looks forward to your final publication package. Please do not hesitate to contact me if you have any further questions.

Sincerely,
Alexander Decker,
July 19, 2014

Editor-in-Chief
IISTE-Accelerating Global Knowledge Sharing
The International Institute for Science, Technology and Education

The indexation of the journal

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Index Copernicus

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- California State University, United States
- The City University of New York, United States
- Aristotle University of Thessaloniki, Greece
- Universiteit Leiden, Netherlands
Abstract

This Article aims to show the efficiency of application of LRIC (Long Run Incremental Cost) Model in the JTI (Jordanian Telecommunication Industry) at the financial level, especially in the scope financial performance, and the role of the Telecommunications Regulatory Commission (TRC) in the application of this model, and the extent of cooperation that has occurred between the companies and this Commission.

This paper tries to highlights the legislations and the legal versions issued by Telecommunications Regulatory Commission and governmental entities and the extent of commitment the Jordanian Telecommunication companies by these legislations and Legal terms.

The study found a full compliance of these legislation and the regulations which issued by the Telecommunications Regulatory Commission by Jordanian telecommunications companies under study, Zain and Orange Telecom company, , as well as contribute to raising the level of financial efficiency on the financial performance scope. And the researchers found that the Zain Company witnessed an increasing Growth in the item of: Customers, Revenue, EBITDA or EBIT and Net Income after apply the LRIC model. Also the Gross Revenue had a negative Growth between the years 2010, 2011 and 2012. And there is an increasing in the capital expenditures between 2011 and 2012.

Keywords’: (LRIC) Long Run Incremental Cost, Telecommunications Regulatory Commission (TRC), Jordanian Telecommunication Industry (JTI), Jordan Mobile Telephone Services Company (Zain), Jordan Telecom Company (Orange).

The figure shows the financial Growth in Zain Company as the researchers get it from the published from this company:
The figures below show the financial growth in Zain Company as the researchers get it from the published from this company:

**Figure (2)**

**Operational and Financial Performance**

**Figure (3)**

**Financial: P&L**

**Figure (4)**

**Capital Breakdown (USD m)**
The figure shows the financial growth in Zain Company as the researchers get it from the published from this company:

Figure (5)

**Abbreviated balance sheet and abbreviated Income statement, Orange Company**

<table>
<thead>
<tr>
<th>Abbreviated Balance Sheet</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
<td>548.6</td>
<td>596.7</td>
<td>664.6</td>
<td>676.1</td>
<td>692.2</td>
</tr>
<tr>
<td>Liabilities</td>
<td>148.9</td>
<td>195.0</td>
<td>253.1</td>
<td>260.2</td>
<td>273.9</td>
</tr>
<tr>
<td>Shareholders' Equity</td>
<td>399.7</td>
<td>401.7</td>
<td>411.5</td>
<td>415.9</td>
<td>419.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Abbreviated Income Statement</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>352.2</td>
<td>362.9</td>
<td>397.9</td>
<td>401.4</td>
<td>400.1</td>
</tr>
<tr>
<td>Gross Profit</td>
<td>236.6</td>
<td>239.6</td>
<td>252.8</td>
<td>264.6</td>
<td>266.3</td>
</tr>
<tr>
<td>Operating Profit</td>
<td>99.5</td>
<td>113.0</td>
<td>116.5</td>
<td>124.4</td>
<td>127.8</td>
</tr>
<tr>
<td>Net Profit</td>
<td>86.4</td>
<td>87.0</td>
<td>94.5</td>
<td>100.3</td>
<td>104.0</td>
</tr>
</tbody>
</table>

The figures below show the financial growth in Zain Company as the researchers get it from the published from this company:

Figure (6)

**Financial Ratio for Orange Company 2011 and 2012**

<table>
<thead>
<tr>
<th><strong>Profitability ratios</strong></th>
<th>2012</th>
<th>2011</th>
<th>change %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return on Total Assets</td>
<td>12.7%</td>
<td>13.6%</td>
<td>(6.4)%</td>
</tr>
<tr>
<td>Return on Total Equity</td>
<td>20.8%</td>
<td>22.1%</td>
<td>(5.8)%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Liquidity ratios</strong></th>
<th>2012</th>
<th>2011</th>
<th>change %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Ratio</td>
<td>1.59</td>
<td>1.54</td>
<td>3.6%</td>
</tr>
<tr>
<td>Cash Ratio</td>
<td>1.12</td>
<td>1.11</td>
<td>1.4%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Leverage ratios</strong></th>
<th>2012</th>
<th>2011</th>
<th>change %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Liabilities to Equity Ratio</td>
<td>62.5%</td>
<td>54.7%</td>
<td>(3.2)%</td>
</tr>
<tr>
<td>Interest – Debt ratio</td>
<td>1.9%</td>
<td>1.8%</td>
<td>(7.4)%</td>
</tr>
<tr>
<td>Total Debt ratio**</td>
<td>39.5%</td>
<td>39.3%</td>
<td>(2.0)%</td>
</tr>
<tr>
<td>Assets Coverage ratio**</td>
<td>76.2%</td>
<td>79.5%</td>
<td>(1.3)%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Assets management ratio</strong></th>
<th>2012</th>
<th>2011</th>
<th>change %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Assets Turnover ratio</td>
<td>62.6%</td>
<td>62.5%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Fixed Assets Turnover ratio</td>
<td>204.0%</td>
<td>194.2%</td>
<td>5.0%</td>
</tr>
<tr>
<td>Total Capital Turnover ratio</td>
<td>101.6%</td>
<td>100.7%</td>
<td>0.9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Growth ratios</strong></th>
<th>2012</th>
<th>2011</th>
<th>change %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dividends per Share (JOD)</td>
<td>0.330</td>
<td>0.359</td>
<td>(7.5)%</td>
</tr>
<tr>
<td>Dividends Payout Ratio</td>
<td>59.3%</td>
<td>100.2%</td>
<td>(0.9)%</td>
</tr>
<tr>
<td>Dividends Yield Ratio</td>
<td>6.2%</td>
<td>6.5%</td>
<td>(4.4)%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Valuation ratios</strong></th>
<th>2012</th>
<th>2011</th>
<th>change %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Book value per Share</td>
<td>1.58</td>
<td>1.61</td>
<td>(1.7)%</td>
</tr>
<tr>
<td>Market to Book Value ratio</td>
<td>3.36</td>
<td>3.44</td>
<td>(2.0)%</td>
</tr>
<tr>
<td>Price – Earning ratio</td>
<td>15.95</td>
<td>15.40</td>
<td>3.6%</td>
</tr>
</tbody>
</table>
Figure (7)

Earnings before Interest, Tax, Depreciation and Amortisation
Appendix 3


Academic Paper Acceptance Letter (2)

Dear: Mr. Abdullah Mahmoud Yousef Jwaifel, Dr. Robert Greenwood, Prof. Robin Matthews
Cardiff Metropolitan University (London School of Commerce)

It’s my pleasure to inform you that, after the peer review, your paper,

The effectiveness of Application LRIC (Long Run Incremental Cost) in the Jordanian Telecommunication Companies (Case Study: Zain, Orange & Unniah)

Has been ACCEPTED with content unaltered to publish with Research Journal of Finance and Accounting, ISSN (Paper) 2222-1697 ISSN (Online) 2222-2847

In order to fit into the publishing and printing schedule, please re-submit your complete publication package by directly replying this acceptance email within 15 days so we can make your article available online/print in the next issue (usually at the end of each month). If you failed to prepare your complete files on time, the publication of your article might be delayed.

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To help the editor of the journal process your final paper quickly, you need to prepare your paper based on the attached “publication_package_instruction.pdf”.

Again, thank you for working with IISTE. I believe that our collaboration will help to accelerate the global knowledge creation and sharing one step further. IISTE looks forward to your final publication package. Please do not hesitate to contact me if you have any further questions.

Sincerely,

Alexander Decker.

Jan 10, 2015

Editor-in-Chief
IISTE-Accelerating Global Knowledge Sharing
The International Institute for Science, Technology and Education

The indexation of the journal

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- California State University, United States
- The City University of New York, United States
- Aristotle University of Thessaloniki, Greece
- Universiteit Leiden, Netherlands
The effectiveness of Application LRIC (Long Run Incremental Cost) in the Jordanian Telecommunication Companies
(Case Study: Zain, Orange and Umniah)

1Abdullah Mahmoud Yousef Jwaifel,
2Dr. Robert Greenwood, 3Prof. Robin Matthews
1, 2, 3, Cardiff Metropolitan University (London School of Commerce)
Head of International Office, Cardiff Metropolitan University, P O Box 377
Western Avenue, Cardiff, CF5 2SG

Abstract
This Study aims to investigate in the effectiveness of application LRIC (Long Run Incremental Cost) in the Jordanian Telecommunication Companies, to achieve the main goals of this study, the researcher decides to distribute Questionnaire to the financial decision makers in these companies which are represented by: Financial Managers, Cost Accountants, Accounts managers (Chief Accountants) and Quality Assurance Managers.

The researcher used several axes to the questionnaire which presented to the target audience in the three companies (Orange, Zain and Umniah), and these axes were formulated in: Financial Performance, Operational Performance and Competitive Performance, through these axes the researcher put some questions he think it would be able to disclosure of the fact the application of the LRIC model in the companies above.

The result of this study came under the researcher expectations, where indicates the existence of a correlation between the applying LRIC models on the Jordanian Telecommunications Companies and (Financial Performance, Operational Performance and Competitive Performance) But in varying degrees.

Keywords: (LRIC) Long Run Incremental Cost, Telecommunications Regulatory Commission (TRC), Jordanian Telecommunication Industry (JTI), Jordan Mobile Telephone Services Company (Zain), Jordan Telecom Company (Orange).
**Appendix 4**

<table>
<thead>
<tr>
<th>Period(s)</th>
<th>General Idea(s)</th>
<th>Author(s)</th>
<th>Specific Concern(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Rewrote the classical economics through developing the marginal – utility theory.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Provided a general model to explain the relationship between the marginal-utility theory and the cost-of-production theory (classical economic theory).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2- F. von Wieser (1892)</td>
<td>- Early work on the theory of cost is (Natural Value, 1893).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Defined the cost of a production process.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- A cofounder of marginalism and theory of utility.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- A famous theorist who developed the classical economic theory.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Has a famous statement regarding supply which serves as an illustration.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- The marginal – utility theory according to Jevons’ statement depends on supply.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4- Herbert J. Davenport (1908)</td>
<td>- Entrepreneurs’ cost through a utility notion.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Described the economic system mainly in terms of the entrepreneur role.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Davenport’s term &quot;Entrepreneurs’ cost&quot; arose from his criticism of other theorists, particularly Marshal, whose writing gave rise to confusion between this term and the &quot;collectivist cost&quot; term.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5- Philip H. Wicksteed (1910)</td>
<td>- Major role was in explaining the Marshalian concepts.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- This role put Wicksteed somewhat directly beyond Marshal.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Although, the Jevons’ role in explaining the Marshalian conceptions regarding the Marginal – utility theory. But, this role of Wicksteed was labelled as precursory.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Provided good examples to define cost – of production or cost price. For instance, inability to make profits, selling the goods at</td>
</tr>
</tbody>
</table>
**Appendix 4**

| 1920’s – 30’s | Opportunity cost and choice  
|               | Price Theory and Supply  
|               | - Envelop Curve  
| 1- Adam Smith (1776) |  
| 2- Philip H. Wicksteed |  
| 3- Edwin Cannan (1927) |  
| 4 Arnold | 

- Defined cost price to be the estimated value, which is measured in relation to gold, of the alternatives which has been sacrificed to place a unit of the commodity which is in question to the market.
- The classical theory relating to exchange value is summarised by Smith who explained that the cost incurred to kill a beaver will be twice the cost of killing two deer. If so, killing one beaver is naturally a good exchange for two deer.
- The opportunity cost that is incurred on a beaver in accordance with Smith’s model is that of two deer.

- A major role in forming influences that have been made on the correct theory of cost in the late 1920’s and in the early 1930’s.
- Linked the opportunity cost somewhat directly to choice.
- Stressed that the cost of production does not have an effect on supply, whereas, supply can be affected by the anticipated cost.
- This cost may be deemed to "influence the craftsman in determining whether he will produce it or not".
- The critical relationship which stems between cost measurement and the act of choice.
- Costs tend to be a part of choice among alternatives.
- A choice must be subjective to the chooser.
- The difference from the classical theory of cost, which involves that cost, has a direct relationship with commodities which would be produced.

- Has somehow, significant contribution to the cost theory, although he accepted readily the notion of the opportunity cost.
- Made indirect significant contribution to the
<table>
<thead>
<tr>
<th></th>
<th>Plant cost theory by his students and by his colleagues, who reflected on the influence that he had, namely: R. H. Coase and G. F. Thirlby.</th>
</tr>
</thead>
</table>
|5- Frank Knight (1928) | - Demonstrated that his concept of opportunity cost depends on Smith’s model.  
- Said the cost of the beaver was seen as being the cost of the deer and the cost of the deer is that of the beaver. This is the objective and scientific content which exists in the notion of costs.  
- Established the definition of opportunity or alternative - product cost that became used as a paradigm for modern price theory through a number of important papers which were published in the late 1920’s and in the early 1930’s.  
- Mentioned that the price of commodities reflects costs.  
- Indicated in his 1928 paper that the cost relating to producing a commodity which is simply measured by the alternative of the real product that might have been produced if there was a rational use of the inputs.  
- Something was wrong with his definition of the alternative - product regarding measuring the opportunity cost.  
- Tried in his 1934 and 1935 papers to explain his misgivings, but without great success.  
- Modified the concept of alternative product taking into account the differences that arise in the boredom of different uses, particularly in the application of labour element. |
|6- Roy Harrod (1931) and Jacob Viner (1931) | - Contemporaneously published articles containing diagrams showing the relationship between the LRAC curve and a set of SRAC curves.  
- In legendary 1931 Zeitschrift für Nationalökonomie article, Viner had instructed the mathematician Y. K. Wong, to draw the long-run average total cost curve so that it would run tangent to the bottoms of the short-run U-shaped curves, be downward sloping, and nowhere lie above the short-run |
Appendix 4

curves.
- Wong insisted that it was impossible to satisfy all three requirements and produced a diagram with the long-run curve lying, on one portion, above the short-run curve.
- In a footnote, Viner (1931, p. 36n) admits that the diagram was in error in placing the long-run curve above the short-run, but confesses that he did not understand Wong’s mathematical reason for it being impossible to draw the long-run curve nowhere above the short-run curves while running along the bottoms of the short-run curves: "I could not persuade him to disregard his scruples as a craftsman and to follow my instructions, absurd though they might be".
- Harrod (1959, p. 262) recounts the experience, when working on his 1931 paper at Oxford, of wandering outside with his curves on Tom Quad in Christ Church in quest of a scientific colleague who could tell him the proper name for the long-run curve.
- His quest was successful and allowed him in the 1930’s, unlike Viner, to properly describe the LRAC curve as an envelope.

7- Lionel Robbins (1934)
- Provided the basis of the opportunity – cost concept. Then, attributed all this to Wieser.
- Stressed that the cost has to be defined in relation to the value and not in relation to the real product.
- Provided several statements which involve a different basic connotation of cost.
- Said with regards to the relationship between price and cost, the condition that stipulates that the prices are equal to the cost of production in terms of the value is deemed to be an essential condition of the equilibrium in the walrasian system as is the condition that the marginal products are proportionate to the factor prices

8- Hayek (1934 -1935)
- Emphasised clearly that the cost relating to production is difficult to calculate when using a socialist setting mainly, due to the absence of the condition that relates to competitive
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>equilibrium, where the cost incurred in production has a very precise meaning. And this emphasis that was also seemed clearly in Robbin’s work.</td>
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</tbody>
</table>
| 9- A. P. Lerner (1937) | - Got a golden opportunity to prove his opinion through an effective reply, which argued simply for the adoption of a rule for setting prices at marginal opportunity costs. That was happened when Hayek, Mises and Robbins left the way open for him to improve his opinion.  
- Emphasised clearly that cost that relates to production becomes problematic to calculate in a socialist setting primarily, due to the absence of the condition of competitive equilibrium, where "cost of production had indeed a very precise meaning". And this emphasis that was also seemed clearly in Robbin’s work.  
- The concentration on equilibrium by all economists mentioned above had left open an avenue for Lerner to let go of all references that relate to general equilibrium in the derivation of the policy rules which explicitly require an introduction of objectively measuring costs. |
| 10- Ronald H. Coase (1938) | - The major contribution was in the context of clarifying the concept pertaining to opportunity cost within the firm's theory framework.  
- His analysis in the 1938 papers was not fully consistent with both of the works of Hayek and Mises.  
- Did not distinguish between his own concept and that adopted in the neoclassical theory.  
- Stressed on the necessity of linking cost with choice decision. And also he rejected the classification of cost into categories, such as: fixed as well as variable, independently of the decision of the choice.  
- Early work on the firm's theory was in the context of explaining the choice decision without taken into account the imperfect and |
monopolistic competition models.
- Was entirely correct in his argument when he emphasised that profits which are foregone should be included in the calculation of opportunity cost and also in the insistence he made that cost can be deemed to be considered as costs which can be avoided by an organisation by not having made a particular decision.

| 1940’s – 1950’s | - Marginal Cost Controversy | 1- Ludwig von Mises (1940) | - In his great work (Human Action) that was published in English – language in 1940 provided an advanced contribution in developing the opportunity cost theory, where this contribution stemmed from his deep understanding for the opportunity cost conception.  
- In a modern reading to this earlier contribution, it can be seen that Mises made an attack on the notion of using a socialist calculation, which is fully consistent with the conception of opportunity cost which emerged upon being more developed later.  
- Despite of this argument was not understood at that time. But, it is quite related with the later developments in cost theory.  
- His contribution in developing cost theory surely deserves recognition along with Wicksteed and Knight. This indeed had a significant influence on the work that was done by Robbins and Hayek. |
| 2- G. F. Thirlby (1946 – 1960) | - In his 1946 papers, like Coase, tried to explain the related economist's notions of cost to make it more acceptable and consistent, particularly opportunity cost conception.  
- On the contrary of Coase, Thirlby's analysis was fully consistent with the analysis of Wicksteed.  
- What is distinguished the earlier contribution of Thirlby is his emphasis on the ephemeral nature of cost.  
- The verbal signified of Thirlby's concept of opportunity-cost stems from his concern of the question of the so-called (rules) for pricing, and this related to the content of the... |
- Stressed that the valuations of the lost opportunity should be taken into account, otherwise there is no any rule which could ever be applied to determine the preferences of people.
- Rejected the orthodox distinction that was made between "long run" and "short run", and he explained clearly that the cost is incurred only when the decisions are made during the planning stage. Clarified the distinction that existed between what we call the decision (budget) and that of the calculation of accounting levels and the cost which is relevant to the decision made, it must also reflect the value which is attributable to foregone alternatives. While, a budget, however, reflects on the prospective and/or anticipated revenue that is likely to arise and is an outlay of the sides of a decision that will be made or has been made.
- In a modern reading to the earlier papers, it can be seen that Thirlby may not have entirely identified the instantaneous disappearance of the cost that arises upon decision.
- In his published 1960 paper (The Ruler) however, this point is elaborated on. "The cost value will never be objective; i.e., it will not be possible to ascertain whether the predictions of the alternative revenue were correct, as the alternative undertaking will not be in existence to result in the actual alternative revenue".

| 1960’s – 1970’s | - Social cost - New Economy Business 1- G. F. Thirlby (1960) | - In his latest published 1960 paper suggested that subtle shifts in the definition of cost lead to confusion about social cost. - His suggestion is an accurate summary of the distinction that lies between the modern conception of what opportunity cost is and the orthodox conception (classical) which is held by most contemporary economists. 2- G. L. S. Shackle (1961) | - The contributions were in developing the theory of decision is helpful when clarifying the theory relating to cost. |
- Shackle's statements did not make any change in the cost discussions of Coase and Thirlby.
- In contrast, Shackle failed to make the shift of these relevant ideas to his own—though much more elementary—discussion of cost indicates that the classically based predictive theory can exist alongside the logical theory of choice in the thought patterns of a single economist, even though the two theories are incompatible with each other.

3- M. Kirzner (1963)  
- The ideas of Mises on cost have been subjected to further development by two those who followed him. Murray Rothbard adopts in his treatise of two-volumes, *Man, Economy, and the State*, a subjectivist conception of the cost which is closely related to the theory which was advanced by Thirlby.
- In contrast, perhaps and according to Kirzner's Market Theory it can be found to be the most satisfactory form of incorporation of a choice-related notion pertaining to cost into a theory in the context of general price-theory.
Further to the Literature Review

Further to The Empirical literature reviews on the impacts of mobile termination rates

The researcher has arranged the literature review that has evolved the LRIC model particularly the impacts of mobile termination rates through a number of antecedents as the following:

Empirical Literature Reviews on Various the Impacts of Mobile Termination Rates

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Dependent Variable(s)</th>
<th>Independent Variable(s)</th>
<th>Data/time</th>
<th>Source</th>
<th>Methodology</th>
<th>Main conclusion and recommendation</th>
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</thead>
<tbody>
<tr>
<td>Genekos and Valletti (2011)</td>
<td>Prices, firm profits</td>
<td>MTRs (instruments and caused by regulation), prepaid best deal dummy</td>
<td>Match ing differences sources from 1999 to 2006 (collected quarterly) from the mobile operators who operate in 24 countries</td>
<td>Cullen International / Teligen/ Merrill Lynch</td>
<td>IV approach which uses a fixed-effect form of specification</td>
<td>The authors estimated the impacts of MTRs on retail prices and the operators’ profits. Their results showed that MTRs have a significantly and have negative impacts that arise on retail prices.</td>
</tr>
<tr>
<td>Hansen and Andersson (2009)</td>
<td>Function of the firm profits, and market share and</td>
<td>Functions of the MTRs, the average minutes and the number of 26 mobile operators that are from 9 countries</td>
<td></td>
<td>Ovum/ Wireless Intelligence</td>
<td>GMM cluster-fixed effect</td>
<td>The authors used the multi-firm competition model and applied it to the</td>
</tr>
<tr>
<td>Veronese and Pesendorfer (2009)</td>
<td>penetratioon rates, minutes of use, prices</td>
<td>retail regime, concernin g MTRs, GDP per capita, that is dependent on population density, the fixed penetratio n, and region dummy</td>
<td>39 OECD countrie s from the period of 2002 to 2007</td>
<td>Merrill Lynch/ Teligen/ ITU/ World Bank country random effect specificati on which is carried out with the fixed componen ts that are estimated by GLS</td>
<td>The authors have estimated the impacts of MTRs on social welfare proxies consisting of mobile penetration, minutes that are used and retail prices (proxy by average revenue per minute). Their results showed that MTRs have significantly positive</td>
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<td><strong>Cunningham et al. (2010)</strong></td>
<td>mobile subscription</td>
<td>Retail regime, relating to MTRs, number of mobile operators, and government ownership, the Internet subscription, the fixed termination rates, the population Density, GDP, and the average age of population, interaction between no. of mobile operators and MTRs, etc.</td>
<td>85 countries in the period from 2003 (apply 2004 data for dependent variable)</td>
<td>ITU/ Global Comms Database/Merrill Lynch</td>
<td>OLS and the measuring of the explanatory variables which are with time lag whenever possible</td>
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|                             |                     | The authors estimated the impacts that are incurred on the MTRs on mobile subscriptions that are made per person. They found that MTRs had a significantly positive effect that is on mobile subscriptions; however, the results of such coefficients have on the interaction between MTRs and the numbers of operators are usually significantly negative. These results have suggested that MTRs can, therefore, be considered as being a weaker variable if the effects on mobile penetration and retail prices, but the results that are not robust in the minute that are of use variable.

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| Dewenter and Kruse (2011) | Dependent: diffusion rates | retail regime, the competition, prepaid card, and fixed telephone lines per capita, the population of a country, population density in a country, GDP per capita (retail regime and competition and also the instrumented with several regulation variables) | 84 countries from 1980 to 2003 | ITU/ World Bank published data from several regulators | IV approach with fixed effect specification | The authors compared CPP and RPP regimes, which are similar to Littlechild (2006), but focused on the rate of penetration. They found that there has been no significantly different impact that exists between the CPP and RPP and has concluded that the RPP regime is preferred as this too can avoid the regulatory cost. |

Appendix 6: Additional theoretical literature

Adam Smith

The discussion of the notion of opportunity cost started with Adam Smith’s Deer – Beaver model where he summarises the classic theory of exchange value. In Smith’s model the opportunity cost of a beaver in Smith’s model is two deer as he said:

"if among a nation of hunters ... it usually costs twice the labour to kill a beaver, than which it costs to kill a deer. One beaver should naturally exchange for or be worth two deer" (Smith, 1776: p. 65)

As stated by Buchanan (2008), Adam Smith initiates his examination of the determination of comparative rates of products and services by using a story of price creation among hunters, which represents a basic social group. Much of the current debate around Adam Smith’s Deer – Beaver model highlights the key factor of this story. The model can be noted as not presenting a theory but still useful in discussing modern economic circumstances. Furthermore, this builds an educational opportunity that can direct a reader in understanding more complex matters (Sandmo, 2014; Rahim, 2011; Yoon, 2008).

According to the example, this group of hunters hunt deer and beavers with the purpose of selling them directly to the consumers (Smith, 2010). Thus, Adam argues that if the time it takes to kill a beaver is double or more compared to the time it takes to kill a deer, beaver price must be essentially more than twice that of deer. In this example, the prices were based on the hunters’ labour time. Therefore, there is no compelling reason to argue that Adam Smith’s Deer - Beaver model directly illustrates the labour theory of value.

However, there has been an inconclusive debate about whether price creation with regard to supply and demand effects has been confounded by the negligence of the demand view within this story (Rahim, 2011; Yoon, 2008; Wunder, 2010). Thus, further critical discussion is required to decide whether the demand point of view is relevant in price formation or not. However, the demand angle plays a critical role in market outcome determination, but then again, demand angle’s role has been completely related to quantities determination as per the specified unpretentious assumptions related to cost.
(Richard, 2008) - as an example, the Smith’s model highlights the number of deer and beavers supplied to the market.

Buchanan (2008) states that cost decide rates while demand decides quantities. Therefore, according to the example of Smith, costs may contain more elements than labour time. For instance, costs may contain required expenses on weapons and all other probable expenses such as the land usage and production cost. All these elements together will create a natural price for the whole commodity (Rahim, 2011). By considering all these arguments, it can be decided that Adam Smith’s labour theory of value reflects the general cost of production theory of value.

On the other hand, Foley (2009) highlights that actual market rates in actual markets usually differ from natural prices. Adam Smith also focused on this with another example regarding public mourning. In the scenario the demand for black clothes can increase when a king dies. However, as the black clothes supply quantity increment is short run, that higher demand will push the price to go up (Wunder, 2010). Rosenberg (2010) argues that in the long term, the market price will be more than the natural price and it will cause suppliers to enter the market to earn profit when compared to their resource cost. Furthermore, once the mourning time period for the people is over, that higher demand will disappear and prices will be reduced to the normal rate. This agrees with Menudo (2013) and is a common fact in free markets.

On the other hand, market prices may be higher than the normal level due to several reasons (Rosenberg, 2010) – for example, in a public monopoly that is formed due to the combination of exclusive production privileges, the exclusion of entry by other businesses by the government can be a major factor. Therefore, the competitive price can be explained as the price that is below the perfect liberty system while the monopoly price can be explained as the maximum price that is offered by pressing the buyers (Yoon, 2008).

A closer look at the data indicates that in perfect competition, the difference between the market price and natural price matches the modern difference between the short-run and long-run equilibrium value, where the long-run equilibrium value’s cost-based constancy
is the outcome of the norms of continuous revenues to scale for the business as a free and complete entity (Holler, 2010; Wunder, 2010; Richard, 2008; Menudo, 2013).

Therefore, the contemporary view of the long-run equilibrium value is that it is basically equal to the natural price as described by Adam Smith, and market price nonconformities due to its long-run equilibrium are clarified by the contemporary economists’ views (Rosenberg, 2010; Holler, 2010; Richard, 2008) that agree with the public mourning example used by Adam Smith. Therefore, the available evidence seems to suggest that the contemporary economists’ explanation of competition and monopoly is well matched, to a certain extent, with Smith’s reasoning.

Then again, much of the current debate revolves around unsatisfactory aspects of Smith’s analysis. The equilibrium price description of Smith’s analysis in a monopoly context is not discussed in detail and contains a lack of clear examination of profit maximisation (Holler, 2010). In addition, a lack of the general equilibrium perspective can be clearly noticed when Smith appears to reflect on the natural value as produced by the usual rewards to the production factors, instead of regarding both the factor prices and commodity values as being decided by technology, preferences and market structure in modern theory (Sandmo, 2014). The monopoly and perfect liberty system are the restrictive circumstances of competition. On these grounds, there is some uncertainty in the writing of Adam Smith due to a lack of discussion related to circumstances in between (imperfect competition) that have been noticed by modern economists (Yu, 2011; Wunder, 2010).

It is essential to state that, by agreeing with Adam Smith’s explanation, if absence of monopoly can signify actual competition, the critical condition for the occurrence of real competition can be considered as being free entry (Smith, 2010). On the other hand, if a present monopoly situation can be confronted by new arrivals, it will be neither simple nor feasible and rivalry will likely remain for a long period. Smith also states that a large number of competitors cannot ensure effective competition without new arrivals.

Smith highlights the role of the number of manufactures in explaining factors that cause such public conspiracies. According to arguments by Smith, when the number of manufacturers increases each and every manufacturer can be involved in market price
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planning (Smith, 2010). If trade in a city is shared between two businesses, instead of having one person manage the entire trade, both businesses will perform low-priced trade. On the other hand, if trade in the city is shared between twenty businesses, there will be greater rivalry (Sandmo, 2014; Yu, 2011).

Philip H. Wicksteed

Wicksteed has linked opportunity cost to choice, to a certain extent. Wicksteed stated that production cost has no impact on the product value as resources have been dedicated to a particular objective and thus production cost is irrevocable and historical information. This indicates that the production cost never influences supply while supply is influenced by the expected budget. He writes:

"In the sense of alternatives still open which must now be relinquished in order to produce this specific article". So, this cost "influences the craftsman in determining whether he will produce it or not."

Therefore, the crucial requirement of linkage between measurement cost and choice has occurred. According to this primary explanation, costs tend to be a part of choosing from alternatives. Hence, a choice is subjective to the chooser. This is different from classic theory, which states that cost has a direct relationship with goods/services that would be produced.

There is no doubt that Wicksteed had a major role in influencing the theory of cost that emerged in the late 1920's and early 1930's (Foley, 2009).

Edwin Cannan

Edwin Cannan is perhaps known best for his obliteration of classical theory, and this can be best noted in his renowned 1898 work ‘History of the Theories of Production and Distribution’. In spite of the fact that Cannan in his initial years as an economic specialist was a pundit of established economics aspects and a partner of interventionists, he moved strongly to the side of traditional radicalism in the beginnings of the twentieth century. He supported ease, clarity, and judgment skills in the explanation of economics. As per
Geoffrey M. Hodgson, Cannan underscored the institutional establishment of economic frameworks.

Edwin Cannan made no significant contribution to cost theory, but he accepted readily the notion of the opportunity-cost (Artes, 2009).

**Arnold Plant**

Arnold Plant made a indirectly significant contribution to cost theory by way of his students and colleagues, who reflected his influence, such as: Coase and Thirlby, whose contributions are summarised below.

**Frank Knight**

Knight demonstrated that his concept of opportunity-cost depends on Smith's model, which clearly shows in that deer is the cost of beaver and vice versa as the only scientific and objective content for explaining the notion of cost.

Frank Knight established the definition of opportunity or alternate-product cost that became used as a paradigm for modern price theory through a series of important papers, which were written in the late 1920's and early 1930's. He mentioned that the price of goods/services reflect costs. This can be seen clearly in his 1934 and 1935 papers.

However, regarding opportunity cost he indicated in his papers in the late 1920’s, particularly in 1928, that the cost of producing a good or service is basically evaluated by substituting the actual product that would have been made if the inputs were used sensibly.

Yet, within a few years, Knight sensed that something was wrong with his definition of the alternate-product, concerning the measuring of opportunity cost. Therefore, in his 1934 and 1935 papers he tried to explain his misgivings, but without great success. Knight tried to modify the alternate-product definition by taking into account the differences in the boredom of different resource uses, especially in the application of the labour element (Dewenter and Haucap, 2011).
**Lionel Robbins (1934)**
Robbins offered the basis of the idea of opportunity cost. However, he considered that he had just made some clarifications to the uncertainties that had been developed with regards to the Austrian economic orthodoxy. Thus, Robbins refers to Wieser. Nevertheless, it was Robbins stressed that cost can be explained with reference to value instead of actual product. He provided numerous declarations that include a diverse basic cost idea. According to Robbins, with regard to the relationship between price and cost, the situation that price will be equivalent to production cost in value is as vital to an equilibrium situation in the Walrasian system as the proposition that marginal products can be proportional to factor values (Brealey, 2012).

**Abba P. Lerner**
Lerner’s claim was basically for the acceptance of a rule for fixing rates at marginal opportunity costs. When competitive equilibrium does not exist it is hard to calculate production cost.

**Ronald H. Coase**
The major contribution of Coase's work was in clarifying the concept of opportunity cost within the firm's theory framework. It should be noted that his analysis in the 1938 papers was not fully consistent with the works of both Hayek and Mises. He consequently did not distinguish between his view and that adopted in neoclassical theory. Coase stressed the necessity of linking cost with choice decision. However, he also rejected the classification of cost into categories, such as fixed and variable, independent of the choice decision. Coase's early work on the firm's theory was in the context of explaining the choice decision without taken into account the imperfect and monopolistic competition models, which was done in other more widely acclaimed works.

**Ludwig Von Mises**
Mises’s most notable work, Human Action, was published in German in 1940 and in the English-language in 1949. In this book Mises provided an advanced contribution to developing the opportunity cost theory, which stemmed from his deep understanding of the concept of opportunity cost. In a modern reading of the early contributions of Mises, it can be seen that his attack on the possibility of socialist calculation is fully consistent with the concept of opportunity cost.
cost that emerged more fully later. His argument was not understood at the time, but it later related to the developments in cost theory (Cave and Vogelsang, 2003). It should be noted that the contribution of Mises in developing cost theory surely deserves recognition along with Wicksteed and Knight. His work indeed had a significant influence on the work of both of Lionel Robbins and F. A. Hayek.

More to the point, it seems clear that Robbins was affected by Mises's work through his 1934 paper that involved his participation in the great debate over the possibility of socialist calculation. Robbins could have been more effective if he had further explained the difference between cost as an element of a decision process and measurable cost (Dewenter and Haucap, 2011).

**George F. Thirlby**

Thirlby in his 1946 papers, like Coase, tried to explain the economist's notions of cost in order to make it more acceptable and consistent, particularly the idea of opportunity cost. Still, despite his efforts to improve his arguments up to the 1960s it seems that those arguments have been widely neglected (Barnett, 2009).

However, contrary to Coase, Thirlby's analysis was fully consistent with the analysis of Wicksteed. This, and what distinguished the earlier contribution of Thirlby, is his emphasis on the ephemeral nature of cost. On the other hand, however, the significance of Thirlby's concept of opportunity-cost stems from his concern of the question of the (so-called) rules of pricing, and this was the content of his 1946 paper (The Ruler).

It can be seen that in this paper (The Ruler) Thirlby was uninterested with the much-debated question which rule? by trying to obscure the problem with any rule analysis. So, as in his other paper, he emphasised the fact that cost was not ‘an objective something in the sense that it can be scrutinised”. In contrast, Thirlby stressed that the valuations of the lost opportunity should be taken into account, otherwise there is no regulation that might ever be functional in addressing people's partialities (Farahani and Manjappa, 2008).

Thirlby excluded the orthodox difference between short run and long run and he evidently supposed that cost happens merely when choices are completed, that is, in the planning stages. He explained the difference between what we could call the choice (budget) and the calculation of accounting levels.
In this context, cost is applicable to choice, and it must replicate the foregone substitute’s value. A budget replicates the future or expected income and expenditure edges of a choice that has been taken. It is mistaken to reflect such potential expenditures as seen in a financial plan as costs. Thus, the budget must be known from the account that measures recognised incomes and expenditures that occur from a specific action plan. This explanation is a very simple, but then again it is extremely valuable for illustrative matters tasks. It indicates that the forward-looking outline ex ante outline is not adequate in itself to confirm the acceptance of the suitable cost idea (Arnold, 2008).

In this circumstance, the financial plan is a preparation of documents, an ex-ante plan of proceedings. Thus, it can be stated that the financial plan is the balance of expected incomes against expected costs in the applicable opportunity-cost idea. On the other hand, the cost is a part of the budget that measures anticipated outlays, which are to be made as a result of a particular action having already been chosen.

By contrast, the budget cannot replicate the value of an act of substitution that might have been carefully chosen but in a situation where no extra substitute profits with the expected expenditure could be tenable. Although, there is no issue that there can be a specific cost at the moment of choice. After the decision, cost turn out to be objective and, therefore, quantifiable.

In a contemporary reading of the previous papers by Thirlby, it can be noticed that Thirlby did not completely reveal the appearance of cost upon choice. Then, in his 1960 paper (The Ruler), this point is highlighted. The cost figure will never turn objective, as for example it would not be able to uncover whether the projection of the substitute income was right. Therefore, no other alternative exists for producing the alternatives for the actual revenue (Calzada and Trillas, 2006).

2.6 Classic Economic Theory and Marginal-Utility Theory
The classical economic principle is mainly derived from Adam Smith’s theories. It stresses that if the market system power is left alone, it will confirm complete economic resources engagement (Gomez-Baggethun et al. 2010). Classical economists supposed that even though random nonconformities from complete engagement effect political and economic happenings, the automatic changes of salaries, prices and interest rates in the
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market will re-establish the economy to complete engagement (Meade, 2013; Ekelund and Hebert, 2013).

Classical economic theory is based on two premises. It supposes that every person exploits their preferred task under some restrictions, where constraints and preferences are reflected as provided. Next, it supposes the presence of inter-dependences within the markets, among the tasks of all people (Meade, 2013; Gomez-Baggethun et al. 2010). It can then be argued that, based on the pure and perfect competition assumption, these two maxims will decide income distribution and resource allocation. They will control the allocation of production, demand and supply and the optimisation of social organisation. Conventional economists describe an invisible hand, the self-regulating and self-interest economic system of Adam Smith, in addition to monetary institutions development, capital gathering according to the excess production, law of diminishing returns, division of labour in a free market and the capability of the financial system to self-regulate in a laissez-faire structure without involvement of the government (Gomez-Baggethun et al. 2010; Ekelund and Hebert, 2013).

Alfred Marshall

Marshall rewrote classical economics, through developing and applying the notion of marginal-utility theory to provide a general model which, in its turn, presented an explanation of the relative relationship between the marginal-utility theory and the cost-of-production theory (classical economic theory).

Marshall started composing the Principles of Economics in 1881 and spent a significant part of the following decade at work on the treatise. His aimed to produce a two-volume accumulation of monetary thought; the principal volume was distributed in 1890 and set him up as one of the main market analysts of his time. The second volume, which was to address foreign exchange, money, exchange fluctuation, tax assessment, and collectivism, was never completed.

The notion of customer surplus also belongs to Marshall as he noticed that the price is exactly the same for every unit of an item. Consumer surplus is the difference between the amount consumers are willing to pay and the market price. Marshall additionally presented the idea of producer surplus as the difference between the value that has been already paid by the producer and the value that he is willing to accept (Farahani and
Manjappa, 2008). Marshall utilised these ideas to quantify adjustments in prosperity from government arrangements, such as tax assessment. In spite of the fact that market analysts have refined their measures since Marshall, his fundamental way of dealing with what is now called welfare economics still stands.

To make economic matters dynamic as opposed to static, Marshall utilised the apparatuses of established mechanics, including the notion of advancement. With these instruments, neoclassical economists have emulated his example, and take as givens, innovation, market foundations, and individuals' inclinations (Cave and Vogelsang, 2003). In any case, Marshall was not fulfilled by his methodology. He once proposed that "the Mecca of the business analyst lies in monetary science as opposed to in financial elements". As it were, Marshall contended that the economy is a transformative procedure in which innovation, market organisations, and individuals' inclinations advance alongside individuals' conduct.

Friedrich Von Wieser

Natural Value (1893) is the first work for Wieser's; it looked at cost theory in detail. Wieser imputation theory was outlined in this publication and he described the subjective value of resources rather than the cost of production or labour. His clarification of the marginal utility or ‘Grenznutzen’ theory was conclusive. He later wrote about money, tax collection, and social and monetary approach. Wieser’s second principle works was Social Economics (1914).

The economic computation discussion began with his idea of the major significance of precise count to monetary proficiency (Azcoitia et al. 2010). Costs to him indicated, most importantly, data about economic situations and were in this manner vital for any kind of monetary movement. A communist economy, consequently, would require a price framework with a specific end goal to work.

He likewise focused on the significance of monetary change to the business visionary, which he saw as being realised by ‘the courageous intercession of individual men who show up as pioneers toward new financial shores,’ Azcoitia et al 2010:5). This thought of authority was later taken up by Joseph Schumpeter in his economic development treatment.
Not at all like most other Austrian School financial analysts, he dismisses established progressivism, writing that ‘flexibility must be superseded by an arrangement of request.’ (Calzada and Trillas, 2006). This vision and his general answer for the part of a person in history is best communicated in his last book "The Law of Power", distributed in the last year of his life and was a sociological examination of political request.

**William Stanley Jevons**

Jevons was one of three men (in England; Jevons, Vienna; Menger and Switzerland; Walras) who purported marginal revolution, all at the same point in time. Working completely separate from each other, every researcher built the hypothesis of marginal utility to comprehend and clarify consumer behaviour. The hypothesis held that the utility (quality) of each extra unit of a product - the marginal utility – would become lower and lower to the consumer.

Jevons went ahead to characterise the "exchange equation", which demonstrates that for a consumer to expand his or her utility (value), the proportion of the marginal utility of every unit expended to its price should be equivalent. In the event that it is not, then he or she can, with given revenue, reallocate utilisation and get a greater utility.

As a British economist Jevons (1835-1882) was considered alongside Menger and Walras, a prime supporter of marginalism and the hypothesis of utility. Jevons wrote "The Theory of Political Economy" and in 1871, he came up with the idea of marginal utility, from an added substance and detachable utility capacity, despite the fact that the marginal utility theory was not quantifiable in cardinal terms. This research was conceivable because of the works of Johann H. Von Thünen, who first used the term “marginal”. He is considered as an antecedent of econometrics for his work on the business cycle, file numbers and moving midpoints, points on which he utilised his broad knowledge of science.

Despite the fact that his take on marginal utility is considered pioneering amid the development of marginal utility theory, and vital for the advancement of neoclassical economics aspects, Jevons considered that there would be only one conceivable arrangement when considering trade. Francis Edge-Worth’s later work builds on Jevons'. In fact, Jevon is one of the theorists who developed classical economic theory (cost-of-production theory), as the latter was later replaced by the theory of marginal utility.
(Farahani and Manjappa, 2008). Marginal-utility theorists, including Jevons, were considered to be less concerned than their classical theory predecessors with defining costs accurately. This is simply because they assumed that costs were not very important in explaining exchange value; hence, the prices of goods or services were more important than the costs.

Jevons has a famous statement relating to supply as an illustration, which is that *as long as the demands of the consumers must be responded to there exists no requirement of inquiring whether the costs relating to production are deemed to be subjective or objective*. Still, marginal utility according to Jevons's statement relates to the dependency on supply, which ultimately is contingent on the cost of production (Egger and Kreickemeier, 2012).

**Herbert J. Davenport**

Herbert Joseph Davenport (1861-1931) was known as a self-starter whose scholarly profession started before he even entered the PhD program in 1897 at Chicago University, which he completed in just one year. The foundations of his ideas appear to be 19th century French subjectivists. His contribution to economics started with his 1894 article on subjective opportunity cost and finished, apparently, with his "Economics of Enterprise" in 1914, a book on the hypothesis of business sectors and prices.

**Philip H. Wicksteed**

It was with respect to cost in the hypothesis of economic value that Wicksteed considered himself to be most plainly departing the Marshallian conventionality of his British peers. He saw conventionality paying adulation to the hypothesis of marginal utility as presented by Jevons, yet declining to perceive the full ramifications of this hypothesis. Wicksteed defied the outlook of the generational movement, which considered it to be a matter of entirely specialised connections and totally unmistakable from the marginal utility observations overseeing utilisation action.

### 2.6.1 Short Run Costs, Long Run Costs and Envelope Curves

**William Stanley Jevons**

Historically, marginal utility, in the famous statement of Jevons, depends on the supply - which ultimately depends upon the cost relating to production.
**Appendix 6**

**Roy Harrod and Jacob Viner**

To understand the relationship between LRAC curve and SRAC curves, Roy Harrod (1931) and Jacob (Viner 1931) published an important article showing the relationship between two curves. Viner’s ‘Zeitschrift für Nationalökonomie’ instructed YK Wong to draw the long run average cost curve so that it can run tangent to the bottom part of all the short run average cost curves and slope downwards and lie below the short run average cost curves. But according to Wong, it was not possible to complete a diagram like that and satisfy all the requirements of the short run average cost curves and the long run average cost curve.

In a footnote, Viner (1931, p. 36) admitted the error of placing the long run curve above the short run curve and further acknowledged Wong’s opinion that it was impossible to produce a diagram where the LRAC curves lies below the SRAC and he went on to state the following: “I could not persuade him to disregard his scruples as a craftsman and to follow my instructions, absurd though they might be” (Viner, 1931:36 available at http://www.freetochoosemedia.org)

It was Roy Harrod (1959, p. 262) who found a solution to this and produced a diagram exactly the way Viner wanted it to be and when his quest was completed, he could describe his LRAC as an enveloping curve.

**2.7 Social Cost and New Economy Business**

The new economic business and the social cost are reviewed under the headings below:

**G. F. Thirlby**

Thirlby in his latest published 1960 paper, explained that any subtle shifts that occur in the definition of cost may result in confusion in the concept relating to social cost,

‘The slight change in the cost definition according to his own (the entrepreneur's) exiled final-product to the cash input obligatory for the selected action, this change conducive to another notion, which provides with it the vagueness that can be considered as a social cost. It seems to be one of the first definitions of cost, hence it should be an option esteem dislodged, however contrasts from it in that it is not the business person's own particular assessment of his own uprooted finished item, but it is the assessments of the consumers of goods that could be produced by other entrepreneurs that cannot be isolated’.

(Thirlby, 1960:150)
This statement is an accurate summary of the distinction that exists between what is deemed to be the modern conception of what opportunity cost is and the orthodox conception (classical) that is held by contemporary economists (Egger and Kreickemeier, 2012).

**George L. S. Shackle**

The contributions of Shackle in developing decision theory is helpful when defining what the theory on cost is. Shackle's expressions were unchangeable in regard to the cost discussions of Thirlby and Coase. Shackle could not transfer these related ideas to his own; however, the elementary discussions of cost points out that the classical based predictive theory and choice theory are inharmonious with each other (Artes, 2009).

**Isreal M. Kirzner**

Mises ideas on cost were developed further by two of his followers. Murray Rothbard in his treatise of two-volumes, Man, Economy, and the State, and proposed a subjectivist understanding of cost that is closely linked to the theory advanced by Thirlby. According to Kirzner's Market Theory, it can be deemed to be the most satisfactory incorporation of what choice-related notions of cost are when considered in the general price-theory context (Barnett, 2009).