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Module Number: BCO6000

Supervisor of Project: Dr. Esyin Chew

To Design and Develop a Stock Analyser System Used at The Range Home and Leisure Ltd.
**Declaration**

By signing this page, I confirm that all work submitted to complete and support this document is entirely my own work. I also confirm that this dissertation project entitled ‘To design and develop the stock analyser system used in The Range Home and Leisure LTD’ has never been or currently being submitted for another degree.

**Researcher Name:** Adam Rogers  
**Supervisor Name:** Dr. Eysin Chew

**Researcher Signature:**  Adam Rogers  
**Date:** 21/04/2017


**Acknowledgments**

The author wishes to express their appreciation to all of their family and friends who have shown their support throughout this challenging experience. They have offered their advice and support throughout this project and the entire duration of his university course. A huge thank-you must go out to The Range Home and Leisure Ltd in Newport for allowing this project to take place. The participation from everyone involved in the data collection process is much valued. Finally, a special mention must go to Dr. Esyin Chew who supervised the project.
Abstract

The purpose of this research project is to create a proposed improved solution of a system that is used at The Range Home and Leisure Ltd. The system is called the stock analyser and is used by the majority of employees at the company. Its main functionality is presenting information of in-store products such as the stock quantity and delivery details. The author of this project regularly uses the system which sparked the idea to come up with a new design.

Before the design stage can begin, existing literature and software will be researched. This will give an indication of what features the users should expect to see in the new system. The methodology for data collection will be selected and outlined in this project. This will be a framework for collecting data that will support the design of the new system. This will be important as the system must be designed specifically for the user’s needs. The analysis of this data will give the author an indication of the features that should be included in the design.

Once this has been finalised, the design of the system will commence. This will be completed through the use of some modelling techniques to show how the system works. The on-screen interface will also be designed to show how the system is used and the features it will contain. Once all relevant and supporting topics have been discussed. The project objectives as well as the design of the system will be reflected upon. Which will establish if the project was successful or not. How the project could have been researched further will also be suggested.
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1.0 Introduction to Project

This chapter will consist of the introductory paragraphs of this research project. It outlines the structure of the project as well as the reasoning behind the idea for the research. The research scope, research questions and project objectives will also be established.

1.1 Introduction

Modern day organisations have become reliant on systems to support and enhance their business. It has become vitally important for any business to utilise current information systems in order to develop and become more successful. Current advanced technology has allowed business to analyse and understand their data in more beneficial ways. This can help them to improve sales of products and even discover ways of broadening their customer base. It has become an interest of the author to establish ways that data analytical techniques can be used by various businesses to their advantage. This interest was the incentive to conduct and present this research project.

1.2 Background and Problem Definition

A system titled ‘stock analyser’ has been used by the author regularly to complete everyday tasks at a part time job. While using the system, the author recognised that it needs further development to increase its practicality. This encouraged the author to cease the opportunity to design and improve the system for this project. The stock analyser system is used by members of staff at The Range Home and Leisure Ltd. It is a useful way of retrieving information about the company’s stock records. The records of all the company’s stock are entered into a software called Mercatus. Mercatus is the system that orders new stock and where the information is collected from by the stock analyser. However, store assistants and managers do not have access to this program, it is mainly used by administration staff. To use the stock analyser system, the user enters the product’s SKU code which then loads the page of the product’s information. It then loads the product information such as the number of units of stock in store, the on-order quantity, and expected delivery date.
This information is then used to provide customer service and maximise the potential of sales. It is also used to update product quantities in store so the automatic replenishment system remains accurate. The system is a great way of looking up product information, however, it is very basic and doesn’t have any big data analytical functionality. If it were to have such features, it could help the staff understand what their sales data really means. They will be able to make informed decisions from the analysis of how to improve product sales. The information could also be displayed in a more user-friendly way, by changing fonts and location of the text. By regularly using the system, the author has noticed more information that could be displayed to help improve customer service. For this reason, the authors wanted to develop a system that fully fulfils the staff needs and can analyse the stock more effectively.

1.3 Research Scope

In order for the author to produce a proposed solution for the system, they will conduct research that will collect opinions from their work colleges. This will help establish what features that regular users of the system think should be included. It will also be an opportunity to outline potential improvements or downfalls to the current system. All data collected will be in relation to the participant’s thoughts of the system. All types of data collection will strictly focus on this subject to maximise the effectiveness of the data. The author has decided to use convenience sampling for the data collection process. This means due to time and budget constraints the author will only request data from the specific store they work at. Although it would be better for the project to analyse a wider selection of data, the author doesn’t have the time necessary to collect data from other stores. However, the author is confident that the data collected will be valuable and support them in the design of the information system.

1.4 Summary and Project Objectives

To summarise, the project is a design and development proposal of an existing information system used at The Range Home and Leisure Ltd. The author is an employee at the company and regularly uses the system. This has raised ideas for the author as to how it can be improved for the use of the employees at the company. To investigate the feasibility of developing an improved system, the author will gather research from work colleges. The data will be collected
through the use of questionnaires and interviews with senior members of staff. It will discuss their opinions of the current system and also new features for the updated system. The data will then be analysed and will help form the design of the system.

The following aims have been set for the dissertation by the author as goals to determine if the finished project is successful or not.

1. To determine if a new system is actually necessary for the company and to investigate the feasibility of the proposal.
2. To investigate what features the system could have an impact on the meeting of the business's objectives.
3. To design a proposed system that fully meets the needs of the employees.
2.0 Literature Review

In this section, the author evaluates some of the existing systems that are used to analyse stock information for businesses. This will help to establish what analysis features are used by companies and how it can be beneficial for their business. This information can then be put into context that the system is being developed for. This section will also contain a summary and discussion of any literature that has been written previously that can support the project.

2.1 What is a System?

Systems are used in everyday life by almost everyone worldwide. Many people interact with some kind of a system in their daily routine without probably realising it. This could be checking of email, using mobile banking or using any kind of app on smartphone. This is a typical description of a system, however a system is not just in term of technology. Beal describes a system as being ‘a group of interdependent items that interact regularly to perform a task’ (Beal, 2017). This defines a system perfectly as they could be used to display data or to unlock or door for example, which both require interaction from different elements to complete a task.

Information systems are defined as a ‘software that helps you organise and analyse data. This makes it possible to answer questions and solve problems relevant to the mission of an organisation’ (Zandbergen, 2017). These information systems are important to a business and makes everyday task easier and even automated.

2.2 Information Systems in Business

Some kind information systems are used by many organisations and is often a way of expanding and growing as a business. They are also used to make certain tasks easier and more accessible for the employees. For example, a company could use an information system to record, access and edit information about their customers when processing orders. This would be a lot easier than creating and storing paper files which used to be the case before the break through in technology. Information systems have several potential benefits such as ‘improved efficiency in terms of time, human resource usage and costs’ (Ritchie, Marshall, Eardley, 1998, p.32). Another benefit that information systems can provide is ‘increased access for users to all information
sources’ (Ritchie, Marshall, Eardley, 1998, p.32). Employees of a company could still use the information to complete work even if they aren’t physically at the location where the data is created or stored. Businesses can also benefit from information systems as they can provide an ‘improved effectiveness of communications’ (Ritchie, Marshall, Eardley, 1998, p.32). Through the use of email, instant messaging and video conference calls employees can discuss ideas even if they are at different locations.

2.3 Big Data Analytics

Big Data analysis is ‘the process of examining large data sets to uncover hidden patterns, unknown correlations, market trends, customer preferences and other useful business information’ (Rouse, 2014). All leading and successful global companies should use this process to continue to maintain their competitive prominence in their respected markets. They can use it to find out what people are saying about their product online or even discover new business opportunities. For smaller businesses, they can use it to come up with a strategy to break into their market, improve sales and expand their customer base. Even though this sounds like a great way to improve the success of a business there are also many considerations. One of them being the difficulty in finding skilled analysts. According to Rombaut, a company should employ someone who ‘not only understand data from a scientific perspective, but who also understand the business and its customers’ (2016). This makes sense as they will have an advantage as to how to approach the data collection and analysis process. Another consideration would be firstly collecting the correct data for analysis and then secure storage of this data. Collection and cleaning of data will have to be done by a professional.

2.4 Big Data Techniques Used in Existing Research

A few different published articles were considered by the author which discussed ideas regarding stock prediction using big data analysis. Even though they all were focused on predicting the prices for purchasing stock, the ideas should be considered for this project. Hargreaves and Hao (2013) discuss how stock performance could be predicted using analytical techniques. They detail the use of classification techniques such as decision trees and neural networks. This would classify the stock into two categories; the stock that was likely to increase in price and stock that
was likely to decrease in price. A business could then easily distinguish what to stock to invest in order to make the most profit. Decision trees are described as having ‘robustness with a variety of data and levels of measurement, and ease of use’ (Hargreaves & Hao, 2013, p.137). Datasets for big data analysis usually consist of many records so the ability to cope with this is essential for success. Hargreaves and Hao state ‘rules can readily be expressed so that humans can understand them or even directly used in database access language like SQL so that records falling into particular category may be retrieved’ (2013, p.137). This is an important quality for decisions trees as it means humans can understand the information and therefore make an informed decision. This method perhaps could be applied to the transaction data of products. Products with poor purchase records could be classified separately from the products that sell quite well. This should make it easier to establish how to improve sales.

Kim and partners (2016) proposed a system that can predict the prices of stock by using sentiment analysis. The data is collected from social media and news, where users will post comments regarding the stock market. This information is then analysed by the system and then comes up with a prediction of stock price. Sentimental analysis is a great way for a business to find out about their customer’s thoughts and opinions. It could also be applied to establish a products potential for a store. If lots of people are posting negative thoughts about a product, then it could be an indication as to its sales success in the future. Following is figure 1 which shows how their proposed system works and each stage the data goes through. This diagram shows the process of how sentimental data is processed to predict the stock price. Data is collected and stored and then passed through each stage. However, it will be unrealistic for someone to collect the necessary data manually, so the purposes of their study they ‘constructed a data collector to collect such data effectively’ (Kim, Yang, Kim, Park & Choi 2016, p.72). When the collected unprocessed data passes through the lexical parser it extracts words related to the subject such as invest, beneficial and estimation before final prediction.
By utilising sentimental analysis techniques such as this a business can find out about their customer’s opinions. This method could perhaps be applied to predict a product’s potential success. If people were to express their feelings about certain products that they have seen while browsing it could then be analysed to see if they are likely to purchase that product in the future. It could be a possibility that data of this nature may be harder to find. It will be more likely for someone to talk about a product that they have already bought. For example, if a customer were to buy a product they could say they are displeased because of its quality. This method also couldn’t be applied to the transaction data obtained from purchases as it would be quantitative data. This method is used for finding the meaning of words that are often posted online.

Sastry and Babu (2013) explore the analysis and prediction of sales data. They state that the analysis of such data supports ‘many important business processes like preparing annual marketing plans, developing price strategies and manage logistics for material dispatches’ (p.95). By analysing sales data, businesses can plan ahead in order to maximise revenue. They will be able to find out which products are unsuccessful and come up with a strategy of how to improve sales. This could be done through heavier advertisement or by re-evaluating the retail price. Their view of analysing sales data is through the use of clustering algorithms. They have compared factors such as sales value, customers and the amount of time a certain product has been sold in
the space of a year. By doing it this way, the analyst can view a visual representation of results. This makes it a lot easier to for a human to understand and then ultimately make decisions.

The emergence of Big Data analytics and how it affects value creation in supply chain management was evaluated by Chen and partners (2015). ‘Big data analytics has recently risen to potential prominence due to greater ability to both capture vast amounts and employ more powerful analytical techniques to vast data sets’ (Chen, Preston & Swink, 2015, p.7). With the growing and ever changing modern technology it is relatively easy for businesses to get hands on large data sets which can be analysed. These data sets could be a collection of customer details or sales data obtained from transactions. These data sets will contain several hundred thousand or even millions of transactions that take place every day for large companies. In modern days, we can manage and store these amounts of data. He also states ‘powerful analytical techniques to such data sets enables the organisation to automate highly complex decisions that have traditionally been dependent on human judgment (Chen, Preston & Swink, 2015, p.7). This can support businesses a great deal as they can make important investment decisions based analytical techniques. It is essential for a business to utilise some kind, if not a few different types of big data analysis to maintain competitive advantage.

Glass and Colbaugh (2011) discuss the use of predictive analysis to determine if a social media meme will be successful or not. This may not be that relevant for a business but is interesting to see what methods they used to achieve this. They state that they achieved this by the development of ‘a machine learning-based classification algorithm which employs novel network dynamics metrics to accurately predict’ (Glass & Colbaugh, 2011, p.4). This means that the memes will be classified into two groups, those which are likely to be successful and those that aren’t likely. For example, memes that have less than 1000 posts in a certain about of time may not be very successful. This same principal could possibly be applied to sales data. If a certain product didn’t sell a certain number of units in a trial period, the algorithm would classify these products into ones which should be further invested in.
After reading through a few published articles, they all had a similar theme that big data analytics is a very useful for a business. It not only helps to gain and then maintain a competitive advantage, but also helps to discover new business opportunities. The author couldn’t find any existing systems that focuses on the analysis of stock sales data. This could mean that there is currently no data analyser system that is specific to the stock sales figures. There is also no literature written about this king of data analysis. A system of this nature could help a business to establish which products are going to be successful or not based on early sales figures using classification and predictive analysis.

2.5 Existing Big Data Analysis Products Comparison

The following sections of this project will consist of a look at a selection of existing big data analysis products on the market. It will be interesting to see which features they have for customer use and whether or not they could be useful for this system development.

Table 1 below summarises and compares various big data analysis products based on Capterra (2017). It contains a list of features that each product has which allows you to see which product is best suited for your needs.

**Table 1 – Summary of Systems Used for Big Data Analysis (Capterra, 2017)**

<table>
<thead>
<tr>
<th>Title</th>
<th>Developer</th>
<th>Features</th>
<th>Online Review Comments</th>
<th>Deployment</th>
</tr>
</thead>
</table>
| Logikcull            | Logikcull          | Collaboration, Data Cleansing, Data Mining, Data Visualisation, High Volume Processing, Predictive Analytics | • Does the job  
• Needs simplification  
• Faster than fast  | Cloud, SaaS, Web                                                   |
| Sisense              | Sisense            | Collaboration, Data Blends, Data Cleansing, Data Mining, Data Visualisation, Data Warehousing, High Volume Processing, No-Code Sandbox, Predictive Analytics | • User friendly  
• Easy to use  
• Easy to create build errors  | Cloud, SaaS, Web, installation for Windows, Mobile                |
| Espress-Report ES    | Quadbase Systems   | Data Mining, Data Visualisation, Data Warehousing, Predictive Analytics   | • Great security  
• Quick and easy to produce reports  
• Range of reports  | Cloud, SaaS, Web, installation for Windows and mac                  |
<table>
<thead>
<tr>
<th>Product</th>
<th>Company</th>
<th>Features</th>
<th>Installation Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dataplay</td>
<td>Margasoft</td>
<td>Collaboration, Data Mining, Data Visualisation, Data Warehousing, Templates</td>
<td>Cloud, SaaS, Web, installation for Windows</td>
</tr>
<tr>
<td>SPSS</td>
<td>IBM</td>
<td>Collaboration, Data Mining, Predictive Analytics</td>
<td>Installation for Windows and Linux</td>
</tr>
<tr>
<td>Ideata Analytics</td>
<td>Ideata Analytics</td>
<td>Collaboration, Data Blends, Data Cleansing, Data Mining, Data Visualisation, Data Warehousing, High Volume Processing, No-Code Sandbox, Predictive Analytics, Templates</td>
<td>Cloud, SaaS, Web, Installation for Windows and Mac</td>
</tr>
<tr>
<td>Neural Designer</td>
<td>Artelnics</td>
<td>Data Mining, Data Visualisation, Predictive Analytics</td>
<td>Installation for Windows and Mac</td>
</tr>
<tr>
<td>Big Data Integration</td>
<td>Talend</td>
<td>Collaboration, Data Cleansing, No-Code Sandbox</td>
<td>Cloud, SaaS, Web, Installation for Windows and Mac</td>
</tr>
<tr>
<td>Big Data Suite</td>
<td>Pivotal Software</td>
<td>Data Visualisation, Predictive Analytics</td>
<td>Cloud, SaaS, Web</td>
</tr>
<tr>
<td>Cleo</td>
<td>Cleo</td>
<td>Data Blends, Data Warehousing, High Volume Processing</td>
<td>Cloud, SaaS, Web, Installation for Windows, Mobile</td>
</tr>
<tr>
<td>Mozenda</td>
<td>Mozenda</td>
<td>Data Blends, Data Cleansing, Data Mining</td>
<td>Cloud, SaaS, Web</td>
</tr>
</tbody>
</table>

The listed products have all got a selection of the typical big data analysis features. A few of them have collaboration compatibility. This is important especially for large companies. It means that multiple users can edit the same analysis from different locations. An international company with multiple head office locations can work together as one unit. This is ideal as employees don’t need to travel and be in the same place to share and work on ideas. The employee could also work from home if necessary. Data visualisation is another key feature. It helps the analyst to
understand more clearly what the data means. The visual representations can be edited and saved long term. Another feature that a selected few products have is data warehousing compatibility. This means the analyst can pull relative bits of data from multiple datasets for use at the same time. This will be important for large companies as they may have gathered lots of data records which are stored in different places.

2.6 Description of Existing Products

Logikcull is a system that allows users to investigate and manage their data the cloud. It features a ‘discovery automation platform’ (Logikcull, 2017) which allows files to be uploaded and then processed automatically. The system also has search features to easily review past documents. Once finalised, documents can be shared and downloaded from third parties. It features data mining techniques which can discover patterns in large amounts of data. More importantly it has data visualisation which makes it easier for user to see at glance and understand what their data means. This system has lots of features for analysing big data to help the user understand the data more clearly and usefully.

Sisense is a system with cloud compatibility but can also be installed on Windows, as well as accessed using a mobile device. It is described as a ‘business intelligence solution that simplifies analytics for complex data’ in the product highlights document (Sisense, 2017). It simplifies this process by the use of data preparation techniques before analysing. The system also features a data visualisation dashboard which allows the users to look at multiple figures at one time for comparison. The term dashboard is used because visual figures will update accordingly when the raw data is changed or updated. The product highlights document defines some key components of the system to promote it as a ‘single stand-alone solution’ (Sisense, 2017). These features are detailed below;

- ‘Elasticube manager’ which is a ‘super-fast columnar data store’ that allows multiple data sources to be easily viewed and analysed.
- ‘Sisense Web’ which is an environment for the user to create and share dashboards.
- ‘Third-Party Data Access’ allows other users to control the system from other devices.
The impression portrayed from this products website is that it a more complex than the Logikcull. The Sisense application has more features, and seems to have promoted it’s key selling points more heavily and effectively on their website.

EspressReport is a system which was produced by a company called Quadbase systems. This system is that used for business intelligence analytics as well as operational reporting. It has the ability to ‘retrieve data from many data sources and generate reports in a variety of Web-ready formats’ (Quadbase, 2017). The company have also stated that ‘Nearly every report element can be formatted and customized’ (Quadbase, 2017). I think that this is important for users as they may like to alter the look of their reports. It could also be a useful a way of setting their reports apart, such as different colours for genders for example. The overview goes on to layout some of the systems key features;

- ‘Full data connectivity’ allows various data files to be analysed such as databases, excel and text files.
- ‘Report scheduler’ allows reports to be sent via email at specific time.
- ‘Numerous output options’ can export created files into various outputs such as PDF, excel, XML, DHTML etc.
- ‘High-powered data visualisation’ which allows both 2D and 3D charts to be drawn.

Each of the discussed big data analysis software products have different features which can be used in many different ways. Data mining, data visualisation and predictive analysis being the popular features across most products. Data visualisation is an important feature to have when analysing data. It will help the user to understand what the data means more clearly. If the data results were only displayed in numbers, it may be harder to instantly see what it means. Being able to visualise the results adds another dimension to the analysis of data.
2.7 Gartner Report for Advanced Analytics

The Gartner report for advanced analytics platforms is an annual report about the various products on the market for big data analysis. The report features a ‘magic quadrant’ which shows the leading and challenging companies in the market as well as the niche players. This can be viewed below in figure 2.

Figure 2 – Magic Quadrant for Advanced Analytics Platforms

Source - Gartner

Lead companies include IBM, Dell and Rapidminer. IBM’s product called SPSS is a ‘strong product with a large user base that continues to keep up with innovation required by the market’ (Kart, Herschel, Linden & Hare, 2016). However, ‘customers have expressed their desire for more training, better support and documentation’ (Kart, Herschel, Linden & Hare, 2016). This suggests the program is quite advanced and is hard to get to grips with at first use. If the company offered more training to the customers perhaps it would allow them to utilise the features more
effectively. Dells’ product ‘addresses among the broadest set of use cases for advanced analytics, including a new strategic focus on Internet of Things’ (Kart, Herschel, Linden & Hare, 2016). This product seems to reflect the latest emerging technologies and provides users with a variety of features to utilise. However, ‘Dell is still primarily known as a hardware vendor; software is a smaller part of its revenue to date’ (Kart, Herschel, Linden & Hare, 2016). This suggests the company is viewed primarily as a hardware retailer which may turn away new customers as they don’t specialise in this field. Despite of this they are still in the leader’s section, more likely due to their revenue and large existing customer base. RapidMiner is another of the leaders in the market. ‘RapidMiner's customers consistently mention the combination of ease of use, with improved productivity’ (Kart, Herschel, Linden & Hare, 2016). However, RapidMiner has ‘highest percentage of reference customers in this Magic Quadrant reporting challenges or problems with its software’ (Kart, Herschel, Linden & Hare, 2016). This shows that even though it has a large customer base, many people are unsatisfied with their product which could affect their revenue in the future if unsolved.

2.8 Summary of Literature Considered

Table 2 – Summary of Existing Literature

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Title</th>
<th>Main Points</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Ritchie, D. Marshall, A. Eardley</td>
<td>1998</td>
<td>Information Systems in Business</td>
<td>Discusses lots of issues such as IS within an organisation, data security, systems analysis etc.</td>
<td>Perhaps slightly outdated considering how technology has evolved but facts and theory remain valid.</td>
</tr>
<tr>
<td>V. Rombaut</td>
<td>2016</td>
<td>Top 5 Problems with Big Data</td>
<td>Lists ways of overcoming problems faced when utilising Big Data analytics.</td>
<td>Brief overview of the problems, doesn't give a detailed solution.</td>
</tr>
<tr>
<td>Authors</td>
<td>Year</td>
<td>Title</td>
<td>Summary</td>
<td>Notes</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------</td>
<td>-----------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------</td>
</tr>
<tr>
<td>C. Hargreaves &amp; Y. Hao</td>
<td>2013</td>
<td>Prediction of Stock Performance Using Analytical Techniques</td>
<td>Applying data mining techniques to predict the prices of stock for investors.</td>
<td>Does not review any analytics techniques for stock records. Just a price prediction of stock</td>
</tr>
<tr>
<td>S. Sastry &amp; Prof. M. Babu</td>
<td>2013</td>
<td>Analysis &amp; Prediction of Sales Data in SAP-ERP System using Clustering Algorithms.</td>
<td>Analysis of sales data by utilising clustering techniques in order to improve sales revenue.</td>
<td>Focuses on only one big data analytical technique rather than a variety or mixture of several techniques.</td>
</tr>
<tr>
<td>I. Witten, E. Frank &amp; M. Hall</td>
<td>2011</td>
<td>Data Mining Practical Machine Learning Tools and Techniques</td>
<td>Exploring the various techniques of big data analytics and how it can be used.</td>
<td>Does not apply these techniques to use of analysing product sales data.</td>
</tr>
<tr>
<td>K. Glass and R. Colbaugh</td>
<td>2011</td>
<td>Predictive Analysis of ‘Meme’ Dynamics</td>
<td>Exploring the use of predictive analysis to determine if a ‘meme’ is going to be successful.</td>
<td>Only describes one technique of big data analysis.</td>
</tr>
<tr>
<td>Capterra</td>
<td>2017</td>
<td>Top Big Data Software Products</td>
<td>Summaries and compares various big data software products</td>
<td>States what features the products contain but not how they can be used.</td>
</tr>
<tr>
<td>L. Kart, G. Herschel, A. Linden and J. Hare</td>
<td>2016</td>
<td>Magic Quadrant for Advanced Analytics Platforms</td>
<td>Discussion and presentation of many companies in the market.</td>
<td>Only states which companies are leading the market.</td>
</tr>
</tbody>
</table>

### 2.9 Current Stock Analyser Design and Performance

The current stock analyser as previously discussed is used by the employees at The Range Home and Leisure LTD. It is used by entering the SKU code of a product which then loads up its profile of information. The information it displays is sourced from a programme called Mercatus which is where the product information is maintained and stored. This information can be used in the following ways by the employees;
To see if a product is in stock or on order
To see if the product line is active or discontinued
To look at the products sales for the last 5 weeks
Information is also used to fill out a stock analyser sheet, which are used to adjust the stock level of products

These actions are usually completed upon an enquiry from a customer. They may ask an employee if there are any more units of a certain product, which the system can be used to answer. Figures 3 and 4 that follows show how the system works and the information displayed.

Figure 3 – Current Stock Analyser System (Screen 1)

As shown in figure 3, the first screen only has two functions. The first being a drop-down menu which allows you to select which store you want to retrieve information from. The product information will obviously differ from each store. This feature allows employees to check product availability in other local stores. The other function is the search box which allows the user to type in the SKU of the product. The system will only accept a 6-digit code to search for a product. If the system doesn’t recognise the SKU code, then the page will reset.
Figure 4 – Current Stock Analyser System (Screen 2)

Figure 4 shows the second screen of the stock analyser system once the information has loaded. The whole page is basic, including the fonts and colours. The text is displayed in a column format, with the stock condition bar at the bottom of the screen. The main information that the system displays are as follows;

- Available quantity of product (Figure 4)
- On order quantity of product (Figure 4)
- The minimum level of product (Figure 4)
- Average weekly sales (Figure 4)
- Quantity of product in distribution centre (Figure 4)
- On order quantity of product to distribution centre (Figure 4)
- Estimated delivery date (Figure 4)

This information is useful for the employees to provide customer service. However, the information must be kept accurate. If the available quantity of a product is wrong, the automatic replenishment will also be wrong. This could mean the stock is on order because the systems believe the product is in stock. Aside from this, there is not real indication of what the sales data means. The user cannot discover if a product is selling well or how many units have been sold.
previously. If they were able to view this type of information, editing levels of stock will be a lot easier. They will also be able to improve sales of products that are not meeting expectations.

Utilising prediction techniques that Hargreaves and Hao describes (2013) would be useful in the updated system. Prediction of sales can help employees discover which products would need to be promoted more in order to boost sales. They will also discover how many units should be ordered into the store to be prepared correctly and maximise revenue.
3.0 Research Methodology

In this chapter, the author will detail their methodology for conducting this research. The methods selected for collecting data for analysis will be described. The analysis techniques that are going to be used once the data has been collected will also be described. Lastly, the ethical considerations of this research project will be defined.

3.1 Choice of Research Philosophy and Method

For this project, an interpretative research philosophy will be adopted involving deductive case study research strategy. ‘Deductive research develops theories or hypotheses and then tests out these theories or hypotheses through empirical observation’ (Crowther & Lancaster, 2012, p.23). In this project, the author will test out the theory and ideas they have come up with through regular use of the stock analyser system. They will propose possible improvements for the system, which will then be discussed with users of the system. This will allow discussion to be made with users to analyse each improvement. The author can then decide if the certain features should be included in the updated system.

This research project is going to be completed as a case study. ‘The case could be a person, a classroom, an institution, a programme, a policy, or a system’ (Simons, 2009, p.4). In this instance, the case is system that will be re-designed and improved. There are both pros and cons of conducting a case study research strategy in this way. Previous researchers conducting a case study may have ‘allowed equivocal evidence or biased views to influence the direction of the findings and conclusions’ (Yin, 2009, p.14). Therefore, it for it is important that when the author presents their ideas to the users for their input. Another ‘frequent complaint about case studies is that they take too long’ (Yin, 2009, p,15). When conducting the researching element of the project, the questions will be completely relevant and not excessive. The designing of the system will also remain within the scope of the project that was specified in the introduction of this document. This will hopefully help finalise the project without resulting in it dragging out to long. An advantage of uses a case study is that they ‘can be either qualitative or quantitative in nature’ (Garger, 2013). As it supports both methods, it could form better and more accurate results.
3.2 Data Collection and Analysis

To form the design of the updated system, the author will consider information obtained from two different methods. The first being secondary research from websites and existing literature. The other being to conduct primary research. This will give an extensive overview of how a new system will benefit the company. By looking at various literature the author can discover methods and techniques use previously. Other researchers may have used a certain method as part of their project. Their results and rationale for their chosen methods will be interesting to learn. Research of existing analysis systems will also be beneficial.

After, conducting this kind of research the next stage is perform both quantitative and qualitative research. As previously mentioned this will be done through the use of questionnaires and interviews. The author will adopt a convenience sampling method for collecting research data. This method was selected based on the time constraints of the project as well as the ease of being able to go to work and request responses. It is also important that all participants have used the system before for responses to be valid. Questionnaires will be handed out to employees of the company who have had experience with the existing system. They will have used it regularly during work therefore should be able to suggest improvements. Interviews with some senior members of staff will also be conducted to discuss the system in a little more detail. There are many advantages for asking questions as part as a research method as Crowther and Lancaster discuss (2012). Questionnaires and interviews ‘allow the researcher to provide feedback to respondents immediately’ (Crowther & Lancaster, 2012, p.144) which allows clarification and validity to be established in the results. However, participants may feel uncomfortable and fear saying something they regret this ‘can lead to the respondent providing, consciously or not, inaccurate data’ (Crowther & Lancaster, 2012, p.145). This is obviously and issue as data needs to be accurate to be worthy.

Analysis of results obtained from the research methods is the next step of this project. This will draw patterns in the results and make sense of it means. Interviews will be presented in the form of transcripts allowing them to be compared with each other. Common ideas can be discovered and reflected upon. Data visualisation from excel will be used for the questionnaire results to
present the statistical information. The results will be entered into the application which will show which answers were selected the most. This will then show which features are must requested by the users to be included in the updated system. From there, the author can design the system based on the needs of the users.

3.3 Ethical Considerations

By conducting a research project in this way there are many ethical considerations that need to be addressed. They are considered for the safety of both the researcher and participants as well as the success of the project. One potential risk when collecting questionnaire responses is the face to face interaction with participants when approaching them. They may become annoyed when approached during work hours when they could be busy. Participants will only be approached by the author at appropriate times such as lunch breaks to help avoid this issue. They will also be informed that they can refuse to take part and have no obligation to complete the questionnaire. This should make them feel comfortable to refuse to give a response at no annoyance of the author. They will also be informed that they can withdraw their response at any time if they change their mind. The questionnaire will be checked by the supervisor of the project to confirm it’s appropriate and will not cause offence. Questions will then be edited and the questionnaire republished if needed. Shortage of responses is another issue that could harm the validity of the project. A greater pool of results will be better for the project as the research will be stronger and more reliable.

There will be also be some ethical considerations for the semi structured interviews. Participants may not want to give out any confidential information about themselves, company or the system. They will be informed that all data collected will remain anonymous and only be used for the purposes of the project. They will also be reminded that their response can be withdrawn at any time. This will hopefully allow them to freely discuss the topic with no fear of saying something they regret. Another consideration would be shortage of time to conduct the interview due to the busy schedules of the participants. To avoid this the interview will be arranged in advance at a time that best suits the participants. This will be done outside of work hours if necessary and more convenient for the participant.
4.0 Data Collection Results

This chapter will feature an analysis of the results collected from the research. Firstly, the interviews responses will be summarised with the common themes established. Secondly, the questionnaire results will be analysed with the creation of graphs to present the results. By observing the results, the author can design the system based on the specific needs of the users.

4.1 Interview Results

A full transcript of the interviews can be viewed in appendix 1 and 2. The interviews were with senior members of staff who have experience with using the system themselves as well as training employees to use it. This means that they should be in a good position to advise how the system should be improved. The general idea that the interviews portrayed was that a re-design of the stock analyser system was a good idea. Some minor improvements could make the system easier to use and more effective for the employees.

As senior members of staff the participants stated that they do occasionally use the stock analyser system for customer service purposes. The store assistants are the more regular users of the systems as they deal with customer requests multiple times throughout the day. The new system will need to offer more useful information that the senior members of staff can utilise. This information could be product sales data, which can be used to improve these figures. It is yet to be determined if this information should be accessible to store assistants. However, when designing the system all potential users must be taken into consideration. It must be beneficial for all types of employees using it in store.

One theme that was present in both interviews was the importance of ranking the product’s sales. Both participants said if they were able to access a list of best and worst selling items it could help them improve sales. Once the user discovers which products are not selling as expected they can begin to find out why. It may be case of relocating the product so it is more visible for customers. It may also help if the product was merchandised with other decorative products to form an eye-catching display. They could decide whether or not heavier promotion is required. If the users know which products are selling well, they may need to raise the
minimum level for the store so more units can be sold. Although, this information is presented in the form of weekly paper documents, only the top 5 and worst 5 ranked products are shown with no quantity information displayed. If users could access more detailed information at any time it would be more beneficial for the company. Recommender systems were also stated as being useful for them. This would give them idea of which items were bought with together, allowing them to set up displays with these specific items.

Aside from this, search improvements and re-design of the text visuals were also suggested. Currently the only way to search for a product is by entering the SKU code. It will be useful for the user if they could search for a product using keywords. This will make it easier to find a product if the SKU code is unknown. This could be useful if the product was only described by the customer. It would also save time, as the user of the system wouldn’t have to look up the SKU on the shelf or department catalogue. A full list of every active selling line could be provided also. This way the user could find the product from the list using the description and thumbnail. These methods increase the likelihood of the product being found on the system as well as make it a lot quicker to look up a product.

Another theme that was common in both interviews were the considerations of the system, with training to use the new system the main concern. A new system may take some getting used to for the employees especially if it significantly different. It may also become too complicated for employees who are not confident using technology if advanced analysis was implemented into the system. Keeping this separate from the product look up element was suggested by one of the participants. This may be a good idea to keep the system easy to use for the employees.

4.2 Questionnaire Results

The questionnaire was handed out to employees at the store in Newport. By filling out the questionnaire, the participants would provide information about their use of the current stock analyser system. They would also specify if they thought the suggested improvements would be useful for them. This information will aid the author when designing the updated system. Below, a selection of the most important questions have been visualised for analysis. An example of a questionnaire response can be viewed in appendix 3.
Figure 5 – Usage Amount of Current System

Figure 5 shows the percentages of the results for how often the system is used on a typical day in the store. The majority of participants stated that the use the system at least 3-6 times a day. The second most selected answer was 6+ times plus. This shows that the system is used quite regularly by the employees at the store. It is therefore, relied on fair amount.
As shown in figure 6, employees selected customer service as their reason to use the system the most. Employees access information that the system provides to solve customer queries. For example, a customer may find a product and want to know if there is any more in stock. There could be more units of stock in the warehouse which currently hasn’t been put out on the shelves. The system will present how many units of the product are currently available in store as well as the number of units on order. This information can be provided to customers, giving them a few options for their potential purchase. Filling out a stock analyser sheet and adjust levels was the second most selected reason for system use. This is important as it ensures the levels of stock are accurate, meaning the information provided to customer is also accurate. The chart also shows that using the system of sales information was not the reason they mostly used the system for. This may because the employees don’t see the information as being valuable to them or due to the lack of depth of the information. This figure would most likely change if more information was provided and senior members of staff could access sales figures.
The second half of the questionnaire asked the participants about their thoughts on some of the potential features for the new system. One of the questions asked if displaying the best and worst selling products would be useful. To which 56% of participants stated it would help them. This figure I quite close to the number of participants that answered no. This may because they don’t see how this information would help them. As previously mentioned, employees will be able to discover ways of improving the sales of unsuccessful products. However, this information may be more useful for the supervisors who would inform their employees on the statistics.

Questions 9 and 10 were regarding minor user improvements into using the system. Participants were asked if displaying an image within the product profile would be useful. To which a staggering 84% stated it would be helpful. By displaying an image, an employee will instantly identify the product. This is useful for when the customer has provided a SKU code for the product they want to query about. The employee can then use the image to find the product on the shelves or warehouse. Participants were also asked if a re-design of the product search would be useful more specifically being able to search by keywords. 72% of participants responded with yes. By allowing a product to be found using word search, it will be faster for the user as they don’t have to look up the SKU code to be able to conduct a search.

Figure 7 – Big Data Analytics for the New System
Figure 7 shows the results of when participants were asked if several analytics techniques would be useful in the new system. Participants were presented with 4 improvements and were asked if they thought it would be useful or if they were unsure what it was. A prediction of sales and display of product being bought together were the most two popular functions.

They would be useful for employees to know to prepare products in the store to improve sales. Products with low number of sales when predicted, perhaps need to be promoted more heavily. It may be case of arranging products on a more decorative display to make the product stand out more to customers. Cloud access could be very important for the system as it allows the user to access the information over the internet. However, it seems that some of the employees were unsure to how this would benefit them. If this was to be implemented into the updated system, then employees would need to be educated into this matter. Employees also seemed to be unsure what sentimental analysis and how this could unlock useful information. Again, employees would need to be educated on the feature, but it could make the new system too complicated for the users.
5.0 New System Design

This chapter will consist of the design of the new stock analyser system. The design will be formed with the literature review and data collection results taken into account. The system will be presented in a context level diagram and use case diagrams. The physical on screen design of each aspect of the system will also be presented and described in this section of the project.

5.1 System Description

After analysis of existing literature and conducting primary research into the users of the system, decisions can now be made on the new system. The next few sections of this project will present the new system in various diagrams. The new included features and improvements will be explained, and their benefits will be outlined.

The system will be split into two sections. The first being a product look up, which is essentially a re-design of the current system. This will allow users to access information on instore products as they could previously. The user simply search for a product using the associated SKU code or by using key words to bring up the product profile. However, there will be improvements such as usability as well as inclusion of more information. Employees should appreciate the update of the system, as it will make accessing this information faster, easier and more useful. This will have a positive for customers as they should be able to receive the information they have requested faster than before. As before, it is vitally important the information remains accurate to be able to provide correct information to customers. This is the responsibility of the staff if information is noticed as being incorrect.

The second part of the system is the advanced analysis of the product sales figures and information. It has been decided by the author that the system will contain the following functions for product analysis;

- Product sales forecast (up to 3 months)
- Display of products that were bought together
- List of best and worst selling products (per month)
These functions will allow users to understand what the sales figures really mean. The sales information is obtained by the transactions of sales and uploaded to Mercatus. Therefore, it is important these large datasets are maintained by professionals. It also been decided that only managers and supervisors will have direct access to this information. This will be protected by a passcode. The system is split up to keep it simple for the less technical users.

5.2 Context Level Diagram

This context diagram will show the external entities that interact with the system and what information is transferred. ‘The simplicity of the diagram allows anyone to understand the environment and participants of the system’ (Hopkins, 2014). This diagram is usually completed at the start of a systems design and helps define the structure of the system. Below the context level diagram for the new system can be viewed in figure 8.

Figure 8 – Context Level Diagram
As shown in figure 8, there are only 3 separate entities that interact with the system. Two of them are users and the other being the information supplier. The users interact with the system to retrieve product information which is then reported to the customer. The data store called Mercatus is maintained by administration staff and loads the information into the stock analyser system. It is important to note that the system information is updated when the employee notices an error. The error is reported to the administrator which after varication updates the information on Mercatus.

5.3 UML Use Case

This section of the project will consist of the use case diagrams and descriptions. The use case will also be spilt up into two parts to reflect the two sections of the system. These diagrams will be constructed because ‘use-case modelling describes what a system does to benefit users’ (Eriksson, Penker, Lyons & Fado, 2003, p.57). Therefore, these diagrams are very useful when designing a system. ‘A use-case diagram shows actors, use cases and their relationships. The system is defined through the system boundaries’ (Eriksson, Penker, Lyons & Fado, 2003, p.60). Following are the devised use case diagrams for the stock analyser system.

5.3.1 Product Look-Up Use Case

Figure 9 – Product Look-Up Use Case Diagram
### Table 3 – Product Look-Up Use Case Description

<table>
<thead>
<tr>
<th>Primary Actor</th>
<th>User of the system</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal</strong></td>
<td>To look up an in-store product’s details</td>
</tr>
<tr>
<td><strong>Scope</strong></td>
<td>Product look-up within the stock analyser system</td>
</tr>
<tr>
<td><strong>Level</strong></td>
<td>Low level, single sitting</td>
</tr>
<tr>
<td><strong>Stakeholders</strong></td>
<td>Mercatus system administrator</td>
</tr>
<tr>
<td><strong>Preconditions</strong></td>
<td>System is accessed through successful login</td>
</tr>
<tr>
<td><strong>Trigger Event</strong></td>
<td>The selections of ‘Look-Up’ button</td>
</tr>
<tr>
<td><strong>Success Guarantees</strong></td>
<td>Login details are correct</td>
</tr>
<tr>
<td></td>
<td>Product information is entered into Mercatus by system administrator</td>
</tr>
</tbody>
</table>

#### Main Success Scenario

1. Users launches system
2. User logins into system
3. User searches for product
4. User discovers the information they need
5. User exits the system
6. User utilises information e.g. reports to customer

#### Extensions

1a. Network not working therefore not allowing system or information to load
   1a1. Re-set network to relaunch system

2a. User does not know login in details for store
   2a1. Users asks senior member of staff to provide login details
   2a2. User may not be authorised to use system, ask other member of staff

3a. Product cannot be found on system
   3a1. User to double check SKU or product description is correct
   3a2. Check the product list for specific department

4a. Information is inaccurate
   4a1. User requests to change and update information
   4a2. Authorised user processes the change if approved

6a. System shows the product is in stock but not on shop floor display
   6a1. Employee looks for product in warehouse
   6a2. Employee reports back to customer

6b. User checks the information is correct
   6b1. Product level may be changed according to sales
   6b2. User requests to change and update information
   6b3. Authorised user processes the change if approved
5.3.2 Product Analysis Use Case

Figure 10 – Product Analysis Use Case Diagram
### Table 4 – Product Analysis Use Case Descriptions

<table>
<thead>
<tr>
<th>Primary Actor</th>
<th>User of the system</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal</strong></td>
<td>To analyse sales figure for improvement</td>
</tr>
<tr>
<td><strong>Scope</strong></td>
<td>Product analysis within the stock analyser system</td>
</tr>
<tr>
<td><strong>Level</strong></td>
<td>Low level, single sitting</td>
</tr>
<tr>
<td><strong>Stakeholders</strong></td>
<td>Mercatus system administrator</td>
</tr>
<tr>
<td><strong>Preconditions</strong></td>
<td>System is accessed through successful login</td>
</tr>
<tr>
<td><strong>Trigger Event</strong></td>
<td>The selections of ‘Analyse’ button of preferred function</td>
</tr>
<tr>
<td><strong>Success Guarantees</strong></td>
<td>Login details are correct</td>
</tr>
<tr>
<td></td>
<td>Product sales figures are entered into Mercatus by system administrator</td>
</tr>
<tr>
<td><strong>Main Success Scenario</strong></td>
<td>1. Users launches system</td>
</tr>
<tr>
<td></td>
<td>2. User logs into system</td>
</tr>
<tr>
<td></td>
<td>3. User selects analysis</td>
</tr>
<tr>
<td></td>
<td>4. User chooses product or departments</td>
</tr>
<tr>
<td></td>
<td>5. User selects analysis function</td>
</tr>
<tr>
<td></td>
<td>6. User exits system</td>
</tr>
<tr>
<td></td>
<td>7. User utilises information e.g. merchandise products</td>
</tr>
<tr>
<td><strong>Extensions</strong></td>
<td>1a. Network not working therefore not allowing system or information to load</td>
</tr>
<tr>
<td></td>
<td>1a1. Re-set network to relaunch system</td>
</tr>
<tr>
<td></td>
<td>2a. User does not know login in details for store</td>
</tr>
<tr>
<td></td>
<td>2a1. Users asks senior member of staff to provide login details</td>
</tr>
<tr>
<td></td>
<td>2a2. User may not be authorised to use system, ask other member of staff</td>
</tr>
<tr>
<td></td>
<td>4a. Product cannot be found on system</td>
</tr>
<tr>
<td></td>
<td>4a1. User to double check SKU or product description is correct</td>
</tr>
<tr>
<td></td>
<td>4a2. Check the product list for specific department</td>
</tr>
<tr>
<td></td>
<td>7a. Product sales figures are lower than expected</td>
</tr>
<tr>
<td></td>
<td>7a1. Employee tries to discover why the product is unsuccessful</td>
</tr>
<tr>
<td></td>
<td>7a2. Product is re-merchandised for emphasis</td>
</tr>
<tr>
<td></td>
<td>7a3. Heavier promotion is produced</td>
</tr>
<tr>
<td></td>
<td>7a4. Product level is reduced if necessary</td>
</tr>
<tr>
<td></td>
<td>7b. Prediction of sales for 3 months is produced</td>
</tr>
<tr>
<td></td>
<td>7b1. Employee prepares product as necessary e.g. adjust levels</td>
</tr>
<tr>
<td></td>
<td>7c. Prediction of products bought with each other</td>
</tr>
<tr>
<td></td>
<td>7c1. Employees prepares products e.g. creates promotion end or aisle</td>
</tr>
</tbody>
</table>
5.4 System Physical Design

This section of the project will contain the physical design of each screen included in the new stock analyser system. This will help to show and explain the new features added into the system. It would also be useful for developers if the system was to be coded and turned into a reality. All information shows in this section is false, and used primarily used for the purposes of showing where the text goes on the screen.

5.4.1 System Login Screen

The system will contain a login screen for security reasons. This will allow only authorised users to access the system and the information it presents. It will accept the store login passcode which most employees will know. However, to access the analysis section of the system the supervisors and sales managers will have a unique login. Again, to ensure the information is not accessed by unauthorised users. The login screen can be viewed in figure 11 below.

Figure 11 – System Login Screen Design
The login screen is very simplistic as it was intended. The user can clearly identify the system they are logging into due to the image and title. The font is easily readable for users and the action button is also clearly visible. An error displays if the login details are entered incorrectly.

5.4.2 System Home Screen

The home page allows the user to navigate to their desired information destination. From here the user can either bring up a product’s profile of information or analyse the sales figures. The design of the home page can be viewed in figure 12 below.

Figure 12 – Home Screen Design

The new system has improved search techniques. The user can enter a SKU as they previously could and then select the ‘look-up’ button to bring up the product profile. However, users can now also search for a product using its name. For example, by typing in ‘mirror’ a menu will appear showing product containing that word. The list will be updated as the user continues to type, until the message ‘no product found’ appears. Once found and selected, the user selects
‘look-up’ to bring up the product profile. The button text has been kept the same and coloured green to identify it has the advancing button. This re-design will help users to find their desired product more easily even if the SKU code is unknown. The second half of the screen shows the options for analysing the sales figures. The user can enter the SKU of a product to display its predicted sales forecast and the products that were often bought with it. Alternatively, the users can analyse by department. They simply select the department from the drop-down menu and select ‘analyse’. This will display the list of best and worst selling products as well as a sales forecast. Once the user selects ‘analyse’ they will be asked for a login, if a senior account is not currently logged on.

5.4.3 Product Profile Screen

The product profile is where the user discovers information such as the available quantity in store, delivery details and the product quaintly in the distribution centres. This information is used by the employees to help deal with customer queries.

Figure 13 – Product Profile Screen Design
As shown in figure 13, the product profile design is simplistic and easy to use. Sollenberger says one way to achieve a good user interface is to keep it simple and ‘your users need consistency’ (Sollenberger, 2012). The colours and fonts have been consistent throughout the entire design thus far. The simple layout of the text allows the user to easily find the information they are looking for. The top section features the product details with an image of the product alongside. The user can instantly identify the product they are looking at and will know which product the customer is interested in. This should make it easier to locate the product in store. The green bar in the middle of the screen is the stock quantity guideline which has been kept from the previous design of the system. It describes how the current state of the product level. If the product were to be discontinued or the level to low, the bar would change to red to alert the user. The user can also change the store they are looking are via the drop-down bar at the top, this is for customer enquiries on other stores.

The information has been kept from the last system as it was necessary to include it in the new design. There are also been the inclusion of the promotions information, this tells the user if the product is currently on sale. The new system also allows the user to directly print the price label of the product. There is also an option for the user to edit the minimum quantity level of a product which will determine the number of units are in store. This is often changed depending on the success of the product. The user will request the change but approval is needed from a senior member of staff. They will be notified when a change is requested. This eliminates the need for paper form the be filled out however this option is still available for employees.

5.4.4 Product Analysis Screens

This screen allows the user to access the sales information of a specific product. This information will help the employees to discover if a certain product is successful or not. They can then find a solution for improving sales if need be. This page shows the user the products that were often bought with it and how many units have sold over the past 3 months.
This screen will be like a dashboard with the graphs and figures being updated regularly as more transactions take place over time. The user can discover how well a product is selling by looking at the previous sales graph or the average weekly sales figure. They can also view a sales forecast graph which will give them an indication of how many units the store should have for sale. The user can change the week they are viewing by selecting the ‘change week’ button. They can view up to 12 weeks, but can view less weeks if they wish. If the amount of sales isn’t what as expected, the level could be lowered slightly to save the company some money. The employees can also find a way to improve sales of the product by for example moving it to a more visible location. The green bar at the bottom reflects if the product sales are meeting the expected targets. The bar will also change colour depending on the status. The page also features a list of the top 5 products that were bought with the item. This could form a product display featuring the listed items to increase the sales of all products.
By analysing the sales figures by department, the user can see a list of the best and worst selling product per month. They can also see a reflection of the sales of all products on the department per week. The start dates can be changed by the user if they wish, by selecting the buttons at the bottom of the screen. The user can also print the page, so they can take this information with them when working on the department. This information will help to discover which products are not meeting expectations. They can then come up with a solution to improve the sale of the product and department as a whole.
6.0 Further Discussion

This chapter will contain a further discussion of a few topics that the author feels are important to be included in this project. The deployment method for the new system will be discussed and how it will be implemented into the organisation. The authors thoughts on the design and what research should be done prior to the completion of this project will be outlined also.

6.1 User Acceptance of Technology

It as an easy to task to implement a new system into an organisation and it instantly having the desired effect. Some users who are less technical may find it difficult to get on board therefore would require more training on how to use the system. The technology acceptance model was developed and introduced by Davis (1986). ‘TAM posits that two particular beliefs, perceived usefulness and perceived ease of use, are of primary relevance for computer acceptance behaviour’ (Davis, Bagozzi & Warshaw, 1989, p.985). Perceived usefulness is the ‘user's subjective probability that using a specific application system will increase his or her job performance’ (Davis, Bagozzi & Warshaw, 1989, p.985). So, if a user believes the new system will help them perform and succeed at their job objectives they will be more open to using the system. Whereas, perceived ease of use refers to the level that ‘the prospective user expects the target system to be free of effort’ (Davis, Bagozzi & Warshaw, 1989, p.985). It was important for the author that the design of the system in this project was easy to use for this reason. Users must feel confident that a system will be easy to use when firstly interacting with it. ‘Lack of user acceptance is a significant impediment to the success of new information systems’ (Dillon & Morris, 1996). If the new stock analyser was to be developed and implemented into the organisation, it must be done correctly. The employees must be trained appropriately and convinced that the system will benefit them.

6.2 Installation vs. Cloud Compatibility

The deployment of the new system is also important to be established. Both installation and cloud computing will have their specific benefits. When the system is installed, it means it can only be accessed on that computer. Therefore, to implement it throughout the organisation it
must be installed across multiple devices causing a long set-up period. It also ‘requires heavy reliance on the IT team, or third party company, for maintenance and this can cause delays’ (Agility, 2017). So, if the system was to go down, it may take a long time before the organisation can start using it again. Cloud computing means that the system will be hosted over a network and then accessed from a computer. This eliminates installation times and multiple users can access the system from any location. Cloud computing increases effectiveness as it ‘enables cloud consumers to focus their scarce resources on building services to solve enterprise problems’ (Bauer & Adams, 2012, p.14). ‘Cloud tools enable new levels of sharing and collaboration’ (Lynch, 2016), which can be very useful for employees as they could share work they completed. However, cloud computing can be costly as first to set-up but should in the long term save an organisation money as cost of maintain hardware is eliminated. Cloud computing seems to be where technology is heading in modern times. It is widely implemented globally for successful organisation and it can really be the growth engine for a business. As this system has been designed for an organisation that is fully established and successful already it wouldn’t be a high risk to invest into cloud computing. The benefits that cloud computing offers shouldn’t be overlooked. However, when the system is developed and coded the deployment should be discussed by developers and the company executive.

6.3 Design Reflection

Upon reflection of the design, it can be said that the system is simplistic. This was the intention from the start. A drastic change between systems can cause the users to become frustrated when initially using the new stock analyser system. The user will easily be able to navigate around the system and find the information they intend to access. The buttons are clearly labelled and visible so the user can automatically know what they do. The colours and layout of each screen is consistent through the entire system. Nielsen produced and introduction on usability (2012) which contains 5 components. He asks, ‘once users have learned the design, how quickly can they perform tasks?’ and ‘when users return to the design after a period of not using it, how easily can they re-establish proficiency?’ (Nielsen, 2012). Due to the consistency and simplicity of the design users will be able easily learn how to use the system. They will also be able to instantly return to system and use it comfortably after a long period of not using it.
In terms of functionality, the system allows users to complete the task as they previously could from the old stock analyser system. However, they can now analyse their sales data more usefully and look to improve sales with this data. Data visualisation is important for users as it presents the data in a clearer way. The system doesn’t however, allow users to share their findings with other users. It may be beneficial to include these features as data can be transferred between stores. It may be also a good idea to include filters, which allows user to receive data for a specific type of product for example.

6.4 Further Research and Development

In order to take this project further a research could expand the data collection to multiple stores throughout the UK. This project focused on the results obtained from only one store due convivence and time constraints. This would give the research a wider pool of results and the findings may be different. It will also be very valuable to turn this design into a working, coded piece of software. This way users could actually provide feedback on the system and state what improvements should be made. User feedback is very important when design a new system as their needs have to be considered and met.

This system could also be designed as a general system for analysing sales data. Currently, it has been design as a bespoke system only for the Range Home and Leisure Ltd. However, any business who want to analyse their sales data can use a system such as this to improve their sales and remain competitive with their rivals.
**7.0 Conclusion**

In this final chapter, the author will conclude the project. This will be done by reflecting on the project objectives that were outlined in the introduction and establishing if they have been done. The completion of these objectives will ultimately determine the success of the project.

The first objective was to determine if a new system was needed by the organisation and if it would benefit the employees. It was decided by the author that the system would definitely help the employees with work duties. This idea initially came up as the author regularly used the system while working at the company. They noticed a few flaws and improvements that could be made to the system in terms of usability. Upon discussion with the project supervisor the idea came up to include some big data analytical techniques in the system. This was done through analysis of existing literature and then supported by the data collection process. Participants in the study expressed their opinions of the current stock analyser system and general views were that it’s useful but outdated and basic.

The second objective was to investigate the features that the system should have. The author researched existing big data systems to see the features they offered customers. With the improvement of sales and customer service in mind the features were selected, then discussed with participants. Employees including senior members of staff expressed their opinion on the features. The majority of questionnaire results were in favour of implementing the new features into the system as they would benefit the company. The interviewees were also in favour of the features being included as they recognised it would help them meet their job objectives.

The final objective was to design a system that fully meets the needs of the employees. Great care was taken into the current system which is why the functionality has been transferred to the new design. The product information is displayed better with additional search techniques improving the system overall. This can only be positive for the employees and the company for improving sales and customer service. It is with full confidence that the author believes the objectives have been met and the project has been a success.
References

Accessed on: 21/04/2017

[Accessed 16/02/2017]

Accessed on: 18/02/2017


Accessed on: 26/03/2017


Accessed on: 11/04/2017

[Accessed on: 27/01/2017]


Appendix

Appendix 1 – Interview with Senior Manager Transcript

This interview took place on the 29/03/2017. The participant was a senior office manager at The Range in Newport. The transcript can be viewed below.

Describe your role and background at the organisation?
‘I have a manager role at the Range, and I am in charge of pay role and other administration duties. I have been employed at the company for I think 6/7 years. I was trained and then appointed in this role since I started working here’.

How do you use the stock analyser system?
‘If I’m honest, I use it on the rare occasion when I’m assisting on the shop floor to help customers. I recognise the importance of it for our staff to provide customer service. Customer quires about products can be answered by using it.

Would of any of these features be useful for you in a new updated system?
A few different features were suggested.
‘This would be useful for the department managers to know (best/worst selling items). They could use this information to drive the sales up of the not so well selling items. Recommender systems technology for sales of data could be useful for the employees to see whether or not the product should be discontinued. However, this decision is up those who work in the head office, us in store have no control over deciding to discontinue or but a product on sale. It could be used to decide whether or not to order more of a certain product perhaps’.

How else can the system be improved?
‘Well I think the features you have suggested are interesting and should be implemented. The system should be more user friendly, for example searching for item through keywords and perhaps even a full list of all active products so the items can be easily found. I think it may also be good to edit the level of stock directly on the system, this should require a senior member of staff’s password to ensure it’s valid. This would get rid of stock analyser sheets’.
**What considerations do you foresee?**

‘The system shouldn’t be too technical or hard to use otherwise staff will get annoyed. I would suggest that the product information should be similar and the analysis perhaps separate. I also think the connection needs to be improved because if the system goes down then the staff would find it hard to offer the same level of customer service’.

**Who will benefit the most from the new system?**

‘It can benefit everyone if a few improvements were added. More information means that the staff can help the customers more thoroughly and faster, therefore boosting sales’.

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**Appendix 2 – Interview with Supervisor Transcript**

This interview took place on the 03/04/2017. The participant was a supervisor of 3 departments at The Range in Newport. The transcript can be viewed below.

**Describe your role and background at the organisation?**

‘I have been working for the Range Home and Leisure for around 3 and half years. I am a supervisor of 3 departments within in the store, which are Gallery, Textiles and Arts/Crafts. I have been in this role for around a year.

**How do you use the stock analyser system?**

‘I mainly use it to help customers. They may ask me something like, do we have any more of a certain product, to which the stock analyser can help me to answer their questions. My staff will use to complete stock analyser sheets, which are used to monitor and edit stock levels, which I will sign and hand into admin for review. It makes my job easier because I can have all this information on hand when needed’

**Would of any of these features be useful for you in a new updated system?**

**List of best/worst selling products and display products bought together were described.**

‘This list would be useful as we then could then and try and find out why the products are selling well. It may be case of merchandising the products so they are more visible. This information is provided in a weekly document, but isn’t provided often enough. Again, if we
know which products are bought together we could place products together making even more likely the customer will pick up both items’.

**How else can the system be improved?**

‘The fonts, colours and layout isn’t very user friendly. They could be more exciting to look at maybe. The most important information could be at the top making it easier to find. I would also think like you suggested a picture could be displayed, to make it easier to identify products. It will also be useful to have the variant to a product to be noted as they may be under different SKUs, such as curtains with different sizes’.

**What considerations do you foresee?**

‘A new system will obviously take some getting used to, staff would need training’. 

**Who will benefit the most from the new system?**

‘I think it will be managers and supervisors, they have the power to make decisions that can improve sales of products. The system will help us make calls and judgement’.

**Appendix 3 – Ethics Form and Supporting Documents**

Following are all the ethical documents that support this project and were used as part of the process when collecting data. The documents are as follows;

1. Ethics Application Form
2. Letter to Organisation
3. Organisation Approval Email
4. Participant Information Sheet
5. Draft of Semi-Structured Interview
6. Signed Consent Forms
7. Questionnaire
## PART ONE

<table>
<thead>
<tr>
<th>Name of applicant:</th>
<th>Adam Rogers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisor (if student project):</td>
<td>Dr Esyin Chew</td>
</tr>
<tr>
<td>School / Unit:</td>
<td>Cardiff School of Management</td>
</tr>
<tr>
<td>Student number (if applicable):</td>
<td>ST20062290</td>
</tr>
<tr>
<td>Programme enrolled on (if applicable):</td>
<td>BSc (Hons) Business Information Systems</td>
</tr>
<tr>
<td>Project Title:</td>
<td>To design and develop a stock analyser system used at The Range Home and Leisure Ltd.</td>
</tr>
<tr>
<td>Expected start date of data collection:</td>
<td>12/12/2016</td>
</tr>
<tr>
<td>Approximate duration of data collection:</td>
<td>4 weeks (excluding Christmas break)</td>
</tr>
<tr>
<td>Funding Body (if applicable):</td>
<td>N/A</td>
</tr>
<tr>
<td>Other researcher(s) working on the project:</td>
<td>N/A</td>
</tr>
<tr>
<td>Will the study involve NHS patients or staff?</td>
<td>No</td>
</tr>
<tr>
<td>Will the study involve human samples and/or human cell lines?</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Does your project fall entirely within one of the following categories:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper based, involving only documents in the public domain</td>
<td>No</td>
</tr>
<tr>
<td>Laboratory based, not involving human participants or human samples</td>
<td>No</td>
</tr>
<tr>
<td>Practice based not involving human participants (eg curatorial, practice audit)</td>
<td>No</td>
</tr>
<tr>
<td>Compulsory projects in professional practice (eg Initial Teacher Education)</td>
<td>No</td>
</tr>
<tr>
<td>A project for which external approval has been obtained (e.g., NHS)</td>
<td>No</td>
</tr>
</tbody>
</table>

If you have answered YES to any of these questions, expand on your answer in the non-technical summary. No further information regarding your project is required.
In no more than 150 words, give a non-technical summary of the project

The project aims to design and develop an information system used regularly by myself and my work colleges at the Range Home and Leisure Ltd. It is used to analyse products and helps to provide customer service as well as analysing product information such as delivery date and sales history. Even though it provides useful information, it is very basic and doesn’t allow the stock to be analysed in an advanced way. It also doesn’t provide the user with information that can help them improve sales of products. I want to design a new prototype system to make it more useful to improve business proceedings. I will achieve this by researching the last 5 years of journal articles with the latest existing systems to give me an in-depth investigation of the literatures. My research method is case study with a mixed-method: quantitative (questionnaire) and qualitative (interview). The data collected will be from the employees of the company to see what features they would like to have in the new system. I will then design the system with the systems based on my research and let the participants to feedback on the proposal.

DECLARATION:
I confirm that this project conforms with the Cardiff Met Research Governance Framework

I confirm that I will abide by the Cardiff Met requirements regarding confidentiality and anonymity when conducting this project.

STUDENTS: I confirm that I will not disclose any information about this project without the prior approval of my supervisor.

| Signature of the applicant: A. Rogers | Date: 23 November 2016 |

FOR STUDENT PROJECTS ONLY

| Name of supervisor: Dr Esyin Chew | Date: 23 November 2016 |

Signature of supervisor: Esyin Chew

Research Ethics Committee use only

| Decision reached: | Project approved ☐ |
| Decision approved in principle ☐ |
| Decision deferred ☐ |
| Project not approved ☐ |
| Project rejected ☐ |

Project reference number: 2016D0284

Name: Dr Hilary Berger | Date: 10/12/2016

Signature: Dr Hilary Berger

Details of any conditions upon which approval is dependant: Click here to enter text.
### A RESEARCH DESIGN

<table>
<thead>
<tr>
<th>A1 Will you be using an approved protocol in your project?</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2 If yes, please state the name and code of the approved protocol to be used</td>
<td>N/A</td>
</tr>
<tr>
<td>A3 Describe the research design to be used in your project</td>
<td>An interpretative research philosophy will be adopted involving a deductive case study research strategy for gathering both qualitative and quantitative data.</td>
</tr>
</tbody>
</table>

**Questionnaire:**
- I will construct a questionnaire which will help me to find out what features my colleges would like to be included in the system. It will consist of 8-12 questions, which will be enough to cover all the information I want to gain from my responses.
- It will also provide suggestion for improvements that I think the system should have. They will be asked if the feature is beneficial to them to conduct everyday tasks in work.
- I will print the questionnaires and hand them out personally.
- The questionnaire should take about five minutes to complete.
- The questionnaire will be handed out over a few days to allow contact with as many employees as possible. The start date for this will be 12/12/2016.

**Semi-Structured Interviews:**
- The interviews will take place just after the questionnaire results have been gathered.
- 1 on 1 conversation with the participant.
- I aim to have interviews with at least 2/3 or managers/supervisors.
- They will hopefully give me a more detailed understanding of their business needs and what the updated system could provide them.
- Consent form will need to be signed before participant takes part in the interview.

**Participants:**
- I will adopt a convenience sampling method. I will only ask people from my particular store.
- All participants will be over 18 years of age.
- I aim to gain around 20-30 questionnaire responses.
- I aim to conduct 3-4 interviews with senior members of staff.
- I aim to get samples from all over the store with a mix of all departments.
- Participants will have the option whether or not they would like to take part.
- Participants can also decide to withdraw their response at any time.
- All participants will remain anonymous to protect their identity. This will avoid any data they provide to be tracked back to them.
• All data collected from participants will be entirely confidential and stored securely. The data will be password protected on a computer system that only myself will have access to.

Analysis:
• I will adopt a thematic analysis method. I will look to find patterns in my collection of data and find out what the common opinions are.
• The quantitative data collected from my questionnaire will be analysed using Microsoft Excel. Graphs will be produced to present the data and my findings.
• The qualitative data that is collected from interviews will be analysed using thematic coding; and I will then draw conclusions from them.

A4 Will the project involve deceptive or covert research? | No
A5 If yes, give a rationale for the use of deceptive or covert research | N/A
A6 Will the project have security sensitive implications? | No
A7 If yes, please explain what they are and the measures that are proposed to address them | N/A

B PREVIOUS EXPERIENCE
B1 What previous experience of research involving human participants relevant to this project do you have?
I have had experience conducting research using interviews. I did for two of my university modules in my second year of my course. One interview took place in an external organisation from the university, with the other being a client selected by my university lecturer. I had to prepare for these interviews by selecting questions which would hopefully answer everything I needed to know. I was also required to gain permission from the participants and have had practice recording the data from the participant.

B2 Student project only
What previous experience of research involving human participants relevant to this project does your supervisor have?
Esyin Chew has 10 years of experience research involving human participants at undergraduate levels. Some of her previous research experience include the following;
1. Suhakam Goes Digital with Monash
2. The Next Wave of Learning with Humanoid Robot
3. Learning and Assessment Innovation in Healthcare with Wearable Technology
4. Learning and Assessment Innovation in Higher education with Wearable Technology
5. Investigating and developing mobile personal response system
## C POTENTIAL RISKS

### C1 What potential risks do you foresee?

1. **Questionnaire:**
   - 1a. Face to face conversation may cause risk to myself, however unlikely as they are my work colleges.
   - 1b. Questions may be offensive to participants.
   - 1c. Risks of bothering participants when in work, therefore not gaining enough response.

2. **Semi-structured interviews:**
   - 2a. The participant may not want to give out any confidential or personal information.
   - 2b. The participant may regret what they have said in response to a question.
   - 2c. There may be a shortage of time to conduct the interview.

### C2 How will you deal with the potential risks?

1. **Solution for questionnaire risks:**
   - 1a. I will always remain polite when approaching participants to complete my questionnaire for my research. I will ensure they are aware they can refuse to take part and can also withdraw their response at any time. This should make them feel comfortable with refusing to take part if they wish to do so.
   - 1b. I will ensure with my supervisor that all questions on my questionnaire are appropriate and not offensive. I will amend this accordingly before attempting to gain responses.
   - 1c. I will also make sure I approach participants are convenient times to maximise my potential of gaining responses.

2. **Solutions for semi-structured interview risks:**
   - 2a. I will also ensure that every participant understands that the data they provide will only be used for the purposes of this project, are completely anonymous and won’t be misused in any way. If they are still reluctant to answer a certain question, I will disregard it and continue.
   - 2b. I will ensure that they are fully aware that information they have provided can be withdrawn at any time, which hopefully make them feel more comfortable.
   - 2c. Any interviews will be arranged in advance and will only be confirmed when the participant isn’t busy with work activities. I am prepared to do this outside of work hours if convenient for the participant.
Re: Final year research project

Dear Mike Evans

I am currently in my final year of university studying a degree in Business Information systems. In order to complete my course, I am required to construct a research project for my dissertation. The research I gather will be analysed and it will eventually help me to conclude my project.

The project I have decided to carry out is the proposed design and development of the stock analyser system used at your organisation. I regularly use the system whilst in work and want to propose developed version to aid business proceedings. The project is completely fictional, but I am still required to follow all procedures as if it was a real proposal. My research for this will be formed from questionnaire which I will hand out to my colleges as well as interviews. I believe this will allow me to collect enough information to come up with a significant improvement to the stock analyser system.

Areas of interest include;

- Thoughts of the current system
- Thoughts of my proposed improvements to the system
- Thoughts of my proposed new features for the system
- Your suggested developments to the system
- How the system is used throughout the store
- How the system is used in comparison to different job roles

Any information provided by the completion of my questionnaire or from the interviews will be entirely confidential. The information will not be used for anything else other than the support and conclude my research. I look forward to your response. Thank You.

Yours sincerely,

Adam Rogers
Cardiff Metropolitan University
Student Number: ST20062290
Email: ST20062290@cardiffmet.ac.uk

Research Supervisor of Project, Dr Esyin Chew
Email: echew@cardiffmet.ac.uk
Adam,

I have read and understood the letter you have presenting regarding your university project on the stock analyser system.

I would like to confirm that you have full permission to carry out this project and to hand out questionnaires to our employees. I would be glad to hear the results of this and the findings that you receive back.

Any further assistance please do not hesitate to ask.

Yours sincerely,

Mike Evans
Deputy Store Manager
The Range Newport
01633 250951
Participation Information Sheet

Design and Development of the Stock Analyser System

Researcher: Adam Rogers
Cardiff Metropolitan Student Number: ST20062290

Project Summary

The purpose of this research project is to identify the need and benefits of an updated stock analyser system. The current system is used by every member of staff from time to time. The research conducted will help me to design a new system to fulfil our needs as staff members as well as improve stock sales. Your participation will form part of a data collection process for the system design and development project conducted at Cardiff Metropolitan University.

You’re Participation

You have been asked to participate in the study because you as my work college also regularly use the stock analyser system. Throughout the interview, you will be asked about your contact with system and whether or not it fulfils your needs. From there we will discuss ideas for features for a new system of the same concept. I believe you a good candidate to conduct an interview due to your role at the company. Your participation is completely voluntary and you can refuse to take part at any time. You may also withdraw your responses at any time, and it therefore won’t be counted as part of the study. The interview will be held at your convenience and will be arranged upon your acceptance to take part.

Protection of Your Privacy

Any information you provide will only be used anonymously as part of this study. It will only be reviewed by myself and upon completion the assessors of the project. You will not be asked any personal information, and all questions will be relevant to the study. You will be required to sign a consent form granting me access to use the data you provide to be used in the study. Once completed the form will be given in the University and kept securely by the research team. The data collected will be analysed and documented however once the project is completed it will be destroyed. Your consent will be stored securely for 5 years. You have the right to withdraw from the research at any time of the duration above. You will also have a copy for this information sheet to keep or your records.

If you require any more information about this project, please don’t hesitate to contact me;
Adam Rogers, Cardiff Metropolitan University
ST20062290@cardiffmet.ac.uk
Or alternatively, contact the supervisor of the study;
Dr Esiyin Chew, at echew@cardiffmet.ac.uk
<table>
<thead>
<tr>
<th><strong>Order of Semi Structured Interview</strong></th>
<th><strong>Discussed</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ask participant to sign and acknowledge the consent form</td>
<td></td>
</tr>
<tr>
<td>2. <strong>Discuss background of the participant</strong></td>
<td></td>
</tr>
<tr>
<td>- Name of organisation</td>
<td></td>
</tr>
<tr>
<td>- Job role</td>
<td></td>
</tr>
<tr>
<td>- Years working for the organisation</td>
<td></td>
</tr>
<tr>
<td>3. <strong>Discuss how they interact current stock analyser system</strong></td>
<td></td>
</tr>
<tr>
<td>- What tasks does the stock analyser system help you complete in typical working day?</td>
<td></td>
</tr>
<tr>
<td>- How does it make your job easier?</td>
<td></td>
</tr>
<tr>
<td>- What do you think is good about the current system?</td>
<td></td>
</tr>
<tr>
<td>4. <strong>Discuss new features for the developed system</strong></td>
<td></td>
</tr>
<tr>
<td>- Talk about and explain some of the features I have come up with from using the system myself</td>
<td></td>
</tr>
<tr>
<td>- Talk about and explain some of the features I have researched from existing products</td>
<td></td>
</tr>
<tr>
<td>- Are there features you think would improve the current stock analyser system?</td>
<td></td>
</tr>
<tr>
<td>5. <strong>Discuss other ways the system could be improved</strong></td>
<td></td>
</tr>
<tr>
<td>- What do you think of how the information is displayed?, e.g. fonts and colours of the text</td>
<td></td>
</tr>
<tr>
<td>- What other information would you like to be displayed when looking up a product?</td>
<td></td>
</tr>
<tr>
<td>- Can you think of any other way the system could be improved?</td>
<td></td>
</tr>
<tr>
<td>- Will business intelligence tools such as predictive analysis, sentiment analysis, data analytics etc. improve the system?</td>
<td></td>
</tr>
<tr>
<td>6. <strong>Discuss considerations for system</strong></td>
<td></td>
</tr>
<tr>
<td>- What limitations do you foresee if the company were to bring in the new system?</td>
<td></td>
</tr>
<tr>
<td>- How would training of the new system take place? e.g. cost</td>
<td></td>
</tr>
<tr>
<td>7. <strong>Who do you think will benefit the most from the new system?</strong></td>
<td></td>
</tr>
<tr>
<td>8. <strong>Discuss anything else the researcher or participant would like to talk about regarding the project</strong></td>
<td></td>
</tr>
</tbody>
</table>
Participant Consent Form

Name of Researcher: Adam Rogers  
Student Number: ST20062290  
Title of Project: To design and develop the stock analyser system

Participant to complete this section:

1. I confirm that I have read and fully understood the information sheet provided by the researcher for the above project. I have also had the opportunity to ask questions and clarify any information if necessary. [✓]

2. I am aware that my participation is completely voluntary and I can withdraw the information I have provided at any time. [✓]

3. I agree to take part in the above study. [✓]

4. I consent to the interview being recorded. [✓]

5. I allow for the researcher to analyse the information I have given, to support the conclusion of the project. [✓]

6. I agree to my quotes being attributed to me. [x]

7. I would like my organisation and job role to be used when referencing the information I have provided, instead of my name. [✓]

Role of Participant: Supervisor

Signature of Participant: EPRICO Date: 3/04/17  
Signature of Researcher: A. Rogers Date: 03/04/2017
Participant Consent Form

Name of Researcher: Adam Rogers
Student Number: ST20062290
Title of Project: To design and develop the stock analyser system

Participant to complete this section:

1. I confirm that I have read and fully understood the information sheet provided by the researcher for the above project. I have also had the opportunity to ask questions and clarify any information if necessary. ✔

2. I am aware that my participation is completely voluntary and I can withdraw the information I have provided at any time. ✔

3. I agree to take part in the above study. ✔

4. I consent to the interview being recorded. ✔

5. I allow for the researcher to analyse the information I have given, to support the conclusion of the project. ✔

6. I agree to my quotes being attributed to me. ✔

7. I would like my organisation and job role to be used when referencing the information I have provided, instead of my name. ✔

Role of Participant: Senior Manager (Office)

Signature of Participant: [Signature] Date: 29/3/17

Signature of Researcher: A. Rogers Date: 29/03/2017
Design and Development of the Stock Analyser System Questionnaire

The purpose of this research project is to develop a new stock analyser system for the use by myself and my work colleges. It will hopefully help to improve the way everyday tasks are completed. Your contribution will aid in the process of selecting improvements to the system and give me an idea of what the users need. If you do not wish to take part, then you do not need to fill out this questionnaire. If you are happy and willing to take part, it will be much appreciated if you complete all questions. All information is confidential.

I consent that information provided in this questionnaire can be used for the study [ ]

About Yourself

1. What is your gender?
   Male [ ]
   Female [ ]

2. What is your age?
   16-25 [ ]
   26-35 [ ]
   36-45 [ ]
   45+ [ ]

3. What department do you work on?
   ________________________________________

The Current Stock Analyser System

4. How often do you use the stock analyser on a typical day in work?
   1-3 times [ ]
   3-6 times [ ]
   6 times + [ ]
   None [ ]

5. The stock analyser is used for many reasons; please rank the following uses in the order you use them the most. 1 being the most used, 3 being the least.
   For customer service [ ]
   To look up sales information of a product e.g. last sold [ ]
   To adjust levels of stock using stock analyser sheet [ ]

6. Please rank the stock analyser on how useful it is to help you complete everyday tasks in work. 5 being very useful and 1 being not helpful at all. Please circle.
   1 2 3 4 5
The Updated Stock Analyser System

7. Would it be helpful to you if the system displayed the best-selling 5 products and the worst selling 5 products per department?
   Yes [ ]
   No [ ]

8. Would it be helpful if you could request to adjust the levels of stock with the click of a button rather than filling out a stock analyser sheet?
   Yes [ ]
   No [ ]

9. Would it be helpful if an image of the product was displayed?
   Yes [ ]
   No [ ]

10. Would it be helpful if you could search for key words of products rather than just the SKU code?
    Yes [ ]
    No [ ]

11. Would it be helpful if there was an option to print price labels when looking up a product’s information?
    Yes [ ]
    No [ ]

12. Do you think the information could be displayed better? E.g. fonts and colours
    Yes [ ]
    No [ ]

13. Would it be helpful to you if the system could analyse more in depth using the following big data analytics techniques (tick where appropriate)?
    a) Prediction of sales [ ]; Unsure to what it is [ ]
    b) Sentiment analysis from social media [ ]; Unsure to what it is [ ]
    c) Display what products were bought with each other [ ]; Unsure to what it is [ ]
    d) Cloud access [ ]; Unsure to what it is [ ]
    e) Other business intelligence tools of your choice: ________________________________

14. Lastly, is there anything else you would like to add that could be useful to the new system design and development? If no then leave blank.

________________________________________________________________________________________