Investigating How Business Intelligence enhance small businesses: a case study for Nine Months. Ltd company.

A dissertation submitted in partial fulfilment of the requirements for the degree of Bachelor of Science (Honours) in {Business Information Systems}

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Declaration

I hereby declare that this dissertation entitled Investigating How Business Intelligence enhance small businesses: a case study for Nine Months.Ltd company. is entirely my own work, and it has never been submitted nor is it currently being submitted for any other degree.

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Abstract

Gathering, analysing, and updating data seems to be hard for small and beginning businesses. As a result, small businesses are always looking for a technique or system that enhances decision-making support. Small and beginning business that have average productions are finding it difficult to manage and update the data that are relevant to the business. Therefore, Business Intelligence (BI) is defined as a phenomenon to address an advantage if applied in a small business by understanding how BI can be adopted successfully in a small business. In the other hand, a real-life example of an existing small business will be examine it this research study and it has defined as a small business due to its position and situation on the market. This research study will deal with Nine Months (NM) Ltd., a company in Qatar that specialises in designing fine maternity garments. Nine Months is finding it difficult to manage business data, as they are using simple methods to generate and document the business data (such as an Excel sheet and a bill booklet). Thus, there are lacks in showing how productive and how profitable Nine Months is in achieving its business target. The business must engage with new technology and a new system; therefore, a BI tool called Tableau will be defined and implemented to enhance Nine Months’ documenting system. This has been recommended by a BI expert. In addition, a model prototype will be piloted in Nine Months. As they are facing a problem in gathering their data into a single system, this system helps in converting raw data to meaningful data, which assists in the strategic and managerial decision-making process.

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Chapter 1: Introduction

1. Background

Today’s investments in information technology are under increased; each day, new technologies and methods are introduced to help individuals and organisations better develop and achieve their target needs. The information technologies have established database software systems to help in managing data in a way to help define tangible information and knowledge. With the development of information technology, individuals, small business, and large organisations keep looking for an information technology system to support them in making better decisions and enabling them to convert their daily collected data into useful information. Therefore, a business manager can easily have knowledge to what stage the business become. By introducing the term Business Intelligence (BI) into the information technology world, the use of an information system by individuals and organisation becomes more precious and valuable. Therefore, BI can be defined as something that combines factors to help in managing data; it combines a database, analytical tools, architecture, applications and methodologies to enable interactive access to data and to enable manipulation of data. This is done to let business managers and analysts get an appropriate analysis (Turban, et al., 2007).

The purpose of BI is to enable the users, such as business managers, to analyse the current and historical business data, performance, and situation, which will help to make valuable insights and better decisions to improve the business and to achieve the best target (Turban, et al., 2007). BI has a large impact on large organisations, in which the use of BI was first defined for an organisation that has lots of data and where it costs more. As a result, BI has been developed; by introducing new BI tools, it has given small and beginning business the opportunity to enhance their business market position and be more competitive; this is because managers are able to use the right method to analyse their business data. However, the use of BI has become extremely important for any type of business or organisation; BI applications help managers and employees to easily interact with each other because the data is available. It also provides integrated support for managers working alone, in teams, and in organisational hierarchies to manage the organisation and make better decisions.
2. The Research Plan

This research study presents five chapters. Each chapter will illustrate and explain the research to answer the research question and deliver the purpose of this study. The first chapter is the introduction, which will briefly define BI and the state of BI. Furthermore, will give the purpose and aim of this research. The second chapter is the literature review; it will focus on the secondary research, examining relevant studies that support the project title. Therefore, can be delivered from the secondary research, such as journals articles and books. The methodology is in the third chapter; it introduces the research method’s approaches and philosophy, which have been chosen to analyse the data in this research study. The fourth chapter is on analysing the findings, which are the data that have been collected by the interviewer; the chapter also contains an in-depth discussion of the results. The final chapter is the conclusion, which summarises this research study’s outcomes.

3. Research Purpose

The purpose of this research study is to show that BI is an asset that each business sector (especially small and beginning businesses) should have in order to enhance the business from different business aspects. This will be further discussed in the literature review.

4. Aims and Objectives of the Research

4.1 Aim of the Study

This study aims to examine one of the BI tools on a real-life business, which is named Nine Months Ltd.; the company specialises in designing fine maternity garments. The company is currently using Microsoft Excel as a database system. The co-founder finds Excel to be a very basic system, and the company needs new database software technology that helps in updating the data and analysing the company’s current and future condition. To deliver these needs, this study aims to interview an IT specialist to give advice on BI in general and to suggest a BI tool for Nine Months to use. Finally, this study aims to answer whether BI can be used and whether it can have a massive impact on small businesses, just like large organisations.
4.2 Objectives

The objectives of this study are:

- Study the role of BI.
- Define the main business factors that BI can enhance.
- Discuss the case study by analysing the interview data collected.
- Analyse the main problem that will be associated with analysing the case of Nine Months.
- Define a BI tool to be used by Nine Months.
- Test the tool with the company’s co-founder.

4.3 Research Question

The research question for this study is: “How can BI help a small business in collecting, updating and analysing their data?”
Chapter 2: Literature Review

1. Introduction

To gain more knowledge about BI, this chapter will illustrate the history of BI and discuss the components of the BI process. Therefore, it will define the top BI tools that are currently being underused. Moreover, it will further discuss the need for BI in small businesses.

1.1 History of BI

There are a historical development on database system how data were difficult stored and used and how does it become useful to interact with in the meantime. In the past, collecting data and extracting useful information was difficult and time consuming; all data were stored manually on populated spreadsheets or as reports. Storing Valuable information on a piece of paper was difficult to manage and risky. Furthermore, these data needed to be managed in order to generate useful business insights. In the 1960s, data storage changed from manual systems to computerized systems, and the concept of a database was put in practice (Smith, 2009). Edgar Codd (1969) invented databases, and they were used to store different types of data that businesses could benefit from. Moreover, a decision support systems (DSS) was established to extract useful information from raw data, supporting business professionals and managers in enhancing their business decisions and making more rational decisions. However, in that time, to help managers access the data, collecting a piece of data and producing valuable information required a lot of time and expertise. In the 1970s, diverse business application tools were created to help the organisations store data and ease the access the data. For example, the floppy disk was born as a new form of storage (Mason, 2015). There was also structured query language (SQL) and the application of the database query language proposed by Edgar F. Codd to support the Relational Database Model (Priyankara, et al., 2011). The concept of object-oriented programming (OOP) was born in 1970 in order to model real-word objects; the purpose of OOP is to aid in introducing the type of data that will be stored and the types of operations that allow it to manipulate that data (University of Tennessee, Knoxville, 2017). Therefore, when producing this application, there still was the problem of accessing the data; users, such as business managers, could only access the data from one location. However, to solve the access problem, data warehouses were introduced by Bill Inmon and Ralph Kimball
in the late 1970s and early 1980s (Kempe, 2012). The main idea behind data warehouses was allowing the data to be accessed from multiple locations (Smith, 2009). Thus, in the early 1980s, the concept of an executive information system (EIS) emerged to expand the computerized support to top-level managers and executives (Turban, et al., 2007).

Consequently, in 1989, the concept of BI was advertised in order for businesses to fully benefit from the data (Einze, et al., 2014). BI vendors started to establish BI products that had more efficient data management systems and easier interaction with the data. For instance, business professional or managers want a fast and practical way to access data in order to enhance the business productivity and to have a higher performance (Einze, et al., 2014). However, one problem was that data were in different versions and formats; some of the data were structured and others were not. Thus, in the 1990s, BI platforms emerged, and they basically had an acquisition over the business tools (IBM, SAP, Oracle Business Intelligence, ETC). The aim of BI platforms was to deliver the right data to the right people at the right time. BI platforms allow people to access data online and offline. This has allowed the data to be organized, accessed and managed more efficiently, which has helped organizations to make better decisions and solve many of their problems (Smith, 2009). Furthermore, since that period, BI platforms have continually been improving. After explaining the history of BI, this project will analyse more the use of BI in small business. One of the platforms will be used to deliver the aim of the research study (Smith, 2009).
2. Structure and Components of BI

This section will briefly define the BI process and the components that help to define and support decision making.

![Major components of Business intelligence](image)

Figure 1. Major components of BI (Turban, 2007)

2.1 Data Warehouse

The first component of BI is shown in figure 1. On the left side, the data warehouse (DW) is linked to operational systems and data, where it is responsible for the flow of the data from “Operational systems/Data” and designed to store data, as a database or a repository of data. It is designed to make data available for end users. The DW has been made to support decision making in order to simplify reporting and querying for complex optimization (Turban, et al., 2007). Therefore, the DW is subject oriented, and it can be used to analyse a particular subject area. It is responsible for storing data from different sources and making it available for end user (1keydata, 2017). For instance, for a company using a BI tool, the business data will be
located in the DW, and the DW makes the needed data available for use, such as when a manager wants a single piece of data.

2.2 Business Analytics

The second component of the BI process is the business analytics responsible for the end user that use a software tool to create queries and on-demand reports to help analyse the data that are stored in the DW (Turban, 2007). In addition, the terms of reporting and querying are originally defined under online analytical processing (OLAP) (Turban, et al., 2007). For example, there is using open-ended query generation (such as SQL reporting software), ad hoc reports, statistical analysis and building DSS applications (Jaiswal, 2017). Business analytics are the use of data that are stored in the DW, using a company’s software to generate a more sophisticated data analysis.

2.3 Data Mining

The third component of the BI process is data mining; it is used for database information analysis (Turban, et al., 2007). Mainly, the purpose of data mining is the extraction of information and knowledge from the data. The process of cleaning the data involves analysing the data, defining the missing data and cleaning it of any incorrect data. Therefore, data mining should be used in the first stage when applied in an organisation, which needs to work with data that are organised and well-defined. In addition, as part of the data mining process, the data are analysed in order to look for any pattern between the variables; this will help in the second step of the BI process. In addition, this will help the organisation to enhance the outcome.

2.4 Business Performance Management

The final component of the BI process is Business Performance Management (BPM); it is responsible for a balanced scorecard methodology that is a framework for managing (Turban, et al., 2007), defining and implementing business strategies by linking objectives with factual measures (Turban, et al., 2007). The BPM includes dashboards. A dashboard is an interface
that helps a company to generate and introduce business and performance data with graphical presentations, which resemble an automobile dashboard (Turban, et al., 2007).

2.5 Dashboard

In BI, a dashboard can be defined as a data visualization tool that can be used in a business to help display the current status of metrics and key performance indicators (KPIs) (Rouse, 2005). For instance, companies can use a BI dashboard product, which offers a customizable interface and gives the ability to pull real-time data from multiple sources. Having a feature to organize and present data in a way that is easy to read helps the business user to have tangible information and knowledge about how the businesses is satisfied and achieve the need (Rouse, 2005). It combines and arranges numbers, metrics and performance scorecards on a single screen (Rouse, 2005). As a result of their usefulness, using the dashboard and KPIs will be discussed further in the next section which focuses more on the use of the dashboard by applying KPIs in small businesses.

3. The Use of BI in Small Businesses

Explaining the history of BI and defining the structure and components of BI leads to further discussion on the impact of BI in our world, including how BI has made organisation successful as well as how it can be used by small businesses. The impact of BI on the world has continually increased as the use of BI has been adopted and been made a better feature for organisations and small businesses. This has improved customer communication and other factors. Therefore, the following section will state how BI can positively impact small businesses just as it impacts large organisations and companies.

Small businesses can use BI to improve. Using a BI tool will help a manager to generate the business data in a way that he or she can understand the state of the business at the current time. It can help in understanding and addressing whether the business satisfies the customers’ needs or whether the business needs more development to improve its profits and to reach a better future. It is also a valuable tool in decision making (King, 2016). However, not understanding the data will lead the business to sometimes fail, despite having a good position in the competitive market. As stated by Matillion (2017), having poor data as well as the
inability to manage and understand the data are cited as the primary reasons for increased project costs; they could cost businesses 20% to 35% of their operating revenue (Matillion, 2017).

Furthermore, business owners and manager are occasionally afraid, and they might not be able to take a step forward in adopting a BI strategy and using a BI tool in their business strategy. Normally, business owners and managers lack the opportunity to understand the term use and the advantage impact of BI on their businesses. BI can be time-consuming, and a business can save time in collecting data and reporting. An on-point explanation of why BI should be use in small businesses is because ‘Business Intelligence is essentially timely, accurate, high-value, and actionable business insights, and the work processes and technologies in BI tools used to obtain them’ (Holley, 2015). Moreover, these are the reasons why small business should care about BI (Holley, 2015):

1. To improve productivity: Non-BI systems require a lot of time to gather information about the customer, analyse data and form reports. This makes the process time consuming and lowers the productivity of employees. Therefore, by applying a BI tool in small businesses, businesses can have the reports after a click, saving time and lowering labour costs (because fewer employees are needed to generate the same number of reports). BI tools offer the ability to gain a reporting and data analysing system in one click, and this helps to present the business information sources within a couple of minutes (Holley, 2015).

2. To gain sales and market intelligence: It is important for the businesses to understand their customers and know how to attract them. BI helps businesses to do so, more precisely through Customer Relationship Management (CRM), which gathers the customers’ data in a system, saves all the data about the purchasing process, and shows how the customers reacted toward different products (Holley, 2015). Aside from that, CRM makes the process more effective by providing charts and tables. After obtaining this data, the sales department (as an example) can know which channel the customers used more often to buy the product, and this signals that the business should focus on these channels more and potentially improve marketing in poor channels (Holley, 2015).

3. To obtain results that help establish the business goals: BI provides businesses with a system that keeps track of any process. Therefore, the departments can be easily and
continuously updated with new information (Holley, 2015). This will help the business to achieve their objectives because they can fix any failure that occurs throughout the process. This is unlike the old non-BI systems, where businesses set objectives for a project and could not examine them until they got the project’s results. By the end of the project, businesses might find that they did not meet the objective because a failure (which they could not have known about) occurred at the beginning of the process (Holley, 2015).

4. To maximise the return to investment (ROI): A BI system boosts a company’s ROI; this is because it lowers operating and overhead costs. At the same time, BI increases the effectiveness of the marketing and sales department, which increases the ROI as a result (Holley, 2015).

5. To fulfil customers’ needs and satisfactions: As mentioned earlier, BI gives businesses access to the purchasing process of consumers (Holley, 2015), by which the business can know what the consumer liked more and what the market trends are. This will allow the company to build a product that better matches consumers’ preferences and, as a result, increase profitability (Holley, 2015).

6. To improve visibility: For the cases where businesses need to develop their control over certain processes, BI can make it easier for businesses to know the areas that need to be improved in these processes by enhancing their visibility (Holley, 2015).

7. To turn data into actionable information: BI will strengthen the strategic decision process and give the business a better insight into the rewarding strategic plan (Holley, 2015). BI gives the organization a full insight to the internal processes and decisions (such as the market trends) and improves the internal connections between the departments as they all are working on the same system, which shows the updates from each management member. This will streamline the strategic process and get all the departments ready to set a single successful strategy (Holley, 2015).
Therefore, to avoid this lack, small businesses need to focus more on generating a BI strategy and take this strategy under consideration to avoid having poor data. The strategy should focus on which BI tool could help the business. Tools (such as a cloud BI and generating dashboard interfaces for the business) can give the business managers and employees easy access to presenting the current business data, helping all business users to track and predict the state of the business. Furthermore, as stated by Matillion (2017), a cloud BI market has the ability to have great success, particularly with smaller businesses. Thus, the BI Leadership Forum addresses a survey that stated over 46% small businesses are using a cloud BI tool as part of their BI strategy (Matillion, 2017). Therefore, to generate a high-level tracking dashboard, KPIs should be taken into consideration.

3.1 The Most common KPIs Components to Track Small Businesses:

3.1.1. Cash flow forecast

Cash flow forecast is considered one of the most important KPIs for small businesses to track and assess sales and margins, identify problems that the business is facing, and make any suitable adjustment at an early stage. In addition, the cash flow forecast can help the businesses anticipate upcoming surpluses and loan applications (Maguire, A., 2017). To analyse the cash flow forecast, add the total cash in saving to the projected cash value for the next four weeks; then, subtract the projected cash out for the next four weeks (Maguire, A., 2017).

3.1.2. Revenue growth rate

In order to assess whether the business’s sales are increasing or decreasing, calculate the business revenue growth rate orderly to keep the business profitable (Maguire, A., 2017). The revenue growth rate can be found by dividing the business’s total revenue for the current year by the total revenue from the previous year (Maguire, A., 2017).

3.1.3. Inventory turnover

Inventory turnover is the ratio indicating the times that a business inventory is sold and replaced over a given period of time (Maguire, A., 2017). A low turnover indicates weak sales and excess inventory; in contrast, a high ratio indicates either strong sales or large discounts. The
inventory turnover reflects the overall efficiency of the supply chain from supplier to customer (Maguire, A., 2017).

3.1.4. Gross profit margin as a percentage of sales

Using the gross profit margin as a percentage of sales over time can help in easily quantifying the amount of money kept against the amount paid out to suppliers (Maguire, A., 2017). When the gross profit margin as a percentage of sales increases, it indicates that the business is retaining more money; in contrast, if the gross margin as a percentage of sales decreases, it indicates that the business is overspending on its supplies. Therefore, the business owner must reduce the overhead costs or increase the prices of the goods and service to compensate (Maguire, A., 2017).

To calculate the business gross profit margin as percentage of sales, divide the gross profit amount by the sales and multiply it by 100. This will give the business owner an expression of the total profits compared to the revenue (Maguire, A., 2017).

3.1.5. Funnel drop off rate

In business, you can assess the number of visitors who relinquish a conversion process (sales funnel) prior to accomplishment by the funnel drop off rate. The business owner may identify when the prospective buyers relinquish the conversion process, which will identify the problems (Maguire, A., 2017). Therefore, they can make the necessary adjustments to raise sales. In small businesses that depend on the internet as a sales method, the funnel drop off rate has become one of the most critical performance indicators to track (Maguire, A., 2017).

3.1.6. Accounts payable turnover

The accounts payable turnover is a ratio that measures the rate at which the business pays for services and goods, revealing the amount of cash spent on suppliers in a specific period. The change in turnover ratio indicates altered payment terms of suppliers. If the company is paying its suppliers quickly, it is an indication that the suppliers are demanding very fast payment terms or that the company is taking advantage of early payment discounts (Maguire, A., 2017).
In contrast, if the company is paying its suppliers slowly, it is an indication of worsening financial condition and that the turnover ratio is declining from one period to the next (Maguire, A., 2017).

3.1.7. Relative market share

The relative market share is used to compare the market share of the business to the largest competitor in the market (Maguire, A., 2017). It gives an indication of the company’s market share with respect to or relative to a competitor’s market share in the same market (Maguire, A., 2017).

4. Defining BI tools

As the term, big data has been realized, selecting the right technology to be used in the business sector is important. In which dashboards and reporting tools has been realized, such a Tableau, Microsoft Power BI, Grow, Leftronic, Klipfolio, Geckoboard, and Numeric. And these tools are often sold as cloud applications that centralise, visualise and streamline the data. Therefore, these tools had indicated as most BI tools that can introduce the KPIs (The Final Step, 2016).

5. Conclusion:

As a result, the literature review has covered a support existing research studies. And give a measurable meaning to what and how business intelligence can impact on small businesses. As, defining that a dashboard can be implemented and well designed for a business use to give a high standard interface, that can be easy accessible and update.
Chapter 3: Methodology

1. Research Philosophy Overview and View

A research philosophy deals with the way in which data about a phenomenon should be gathered, analysed and used (Dudovskiy, 2016). Thus, it focuses on creating knowledge by collecting secondary and primary data to engage with the data collected and analyse it; this is done to answer the research question. The answer marks the creation of new knowledge. Therefore, it is the process of transforming things believed into things known (Dudovskiy, 2016). There are two types of research philosophies: interpretivist and positivist. The interpretivist philosophy deals with the collection of qualitative data, and this can be done through different methods, such as unstructured interviews and participant observation, in order to collect the data that needs to be analysed in the research study (Fitzpatrick, 2012). The positivist philosophy deals with the idea that reality is stable and can be observed and described from an objective viewpoint. It is defined as a more scientific approach (Fitzpatrick, 2012). This research study will use an interpretivist research philosophy; this is because the research will be analysed by collecting the primary data. An interview will be conducted to help in investigating the research need. Thus, the interpretivist philosophy conducts objective and subjective approaches to achieve valuable results for the research subject (Ruane, 2008).

2. Research Approaches

There are three main research approaches: inductive, detective and addictive. An inductive research strategy will be conducted in this research study because it is meant for gathering qualitative data. This research method will be used because the project is a single case study that will focus on a specific real-life business example. A qualitative case study is adopted to investigate the company owner and a BI technology consultant’s original experiences. The research study will focus on analysing the work flow of the small business and will study Nine Months Ltd.
3. Single-case Study and Qualitative Research

3.1 Sampling in the Qualitative Research Method

Sampling is introducing the number of participants and the community that the research must focus on to answer the research question. In other words, it is not necessary to collect data from the whole community to get a valid finding. The idea behind having a qualitative sampling is to have a sample population to determine which and how many people to select (Mach, et al., 2005). The three most common qualitative sampling methods used in qualitative research are: purposive sampling, quota sampling and snowball sampling. This research will conduct purposive sampling; this is because it is the most common sampling strategy. It is defined as a non-probability sample technique with more judgemental, selective and subjective sampling. In such, is used in research to help a group of participants according to preselected criteria relevant to a particular research question (Mach, et al., 2005). This research study will know whom to recruit as participants by the purposive sampling method. It will interview two candidates, the co-founder of Nine Months and a BI technology consultant. Purposive sampling has a wide range of sampling techniques that can be used in a research study, such as extreme (or deviant) case sampling, typical case sampling and homogeneous sampling (Lund Research Ltd, 2012). This research will focus on the extreme (or deviant) case sampling technique, which is used to focus on cases that are special or unusual—typically in the sense that the case highlights a notable outcome, failure or successes. Thus, it provides significant insight into a particular phenomenon (Lund Research Ltd, 2012).

The co-founder of Nine Months and the BI technology consultant were interviewed using the recording application in an iPhone. Each interviewee took around 10 minutes to answer the questions; questions and answers are addresses in Appendixes B and C. To analyse the interview for qualitative research, the record was transcribed using a transcription software feature, which was named NCH Software. Then, the transcript was analysed and coded using NVivo with thematic coding analysis; themes were introduced and coded, as defined in Appendix A. For instance, the theme has been defined in each interview transcript and classified into three different indicators that need to be focused on when analysing the interview as a case study. The first indicator is adaptation, which is defined as determining the relationship between the two interviews by knowing what should be changed in the Nine Months case study. The second indicator is seeking information, which defines any kind of information that would help in analysing the case study. The last indicator is problem solving,
which is defined as the tool that must be used to sort the issue that occurred in the Nine Months case study.

3.2 Single-case Study

The reason for choosing a single-case study and qualitative research is due to the aim of generating an in-depth understanding of BI and how it can be applied in a real-life beginning business—specifically, Nine Months (NMs) Ltd.

Thus, a qualitative case study is adopted to investigate the company owner and the BI technology consultant’s original experiences. The research study will focus on analysing small businesses’ work flow and will study the NMs Ltd. case to address the project’s objectives. According to Yin (2003), ‘having a single-case study gives the ability to engage in such rich analysis only serves to better illuminate the case. The pitfall that novice researchers fall into is that they analyse at the individual subunit level and fail to return to the global issue that they initially set out to address’ (Baxter and Jack, 2008).

3.4 Data Validity and Reliability

This research study investigated how BI enhances small businesses, providing a case study for NM Ltd. Would remain highly valid and reliable. The result of the research is expected to have high validity. The primary data that has been collected from the participants will be responded to directly, and they will be valid in the time of analysing the research study and recent applicable to define the research case study. To ensure data validity, triangulations were used (e.g., critical literature reviews, observations and website reviews). With the collected data, a prototype BI system will be designed. All data will remain confidential and will be stored securely in a password-protected computer system. Therefore, the research data collection will remain reliable, and the authenticity of the research will be ensured.

3.5 Ethical Considerations:

To ensure that the data collected is safeguarded, qualitative researchers must consider formal research ethics. Thus, this study has been authorised and approved by submitting a Cardiff Metropolitan University Application Form for ethics approval. The research ethics deal primarily with the interaction between the researcher and the people involved in the research
study (Mach, et al., 2005). However, to ensure that the data that was collected from participants remains anonymous, the data will not be traceable back to specific people. Furthermore, it will not be used for other purposes (Mach, et al., 2005).

Chapter 4: Findings and Discussion

1. Case Study

NMs Ltd. in Qatar specialises in designing fine maternity garments. The idea of the company came from the co-founder, Mariam. When she was pregnant, she decided to design maternity garments, and she discovered a passion and love for designing dresses. Thus, she decided to share the idea with her friend, to collaborate and start a company that is unique in the marketplace of Qatar. The aim was to have a business with a high quality standards. NMs is divided into two different sectors, designing dresses for women during pregnancy and after pregnancy. The business started two years ago; Mariam works part time at NMs and has a full-time job as a genetic counsellor. As the co-founder, Mariam mentioned that she is directing and managing the company, though she also designs the dresses. Mariam said that the business is doing well with customers and they usually get a great feedback. Therefore, the company is achieving customer satisfaction due to their collection of dress designs and their communication method. They are selling their dresses using two methods: Instagram (to display the collection and take orders) and Dress-Me (a multi-brand store located in The Pearl of Qatar). However, Mariam said that, when she started the business, she missed developing a system and mentioned the need for an information system in the business strategy. She thought that data could be generated easily by using an Excel sheet. Thus, the business data are currently being kept in a bill booklet sheet and in a Microsoft Excel sheet, which defines the basic data. And the current data collecting methods are not support decision making. Thus, the tools, such as the Excel sheet, are very simple. The company needs technology or a software system that is easy accessible and updated. They must be able to enter data and give figures that help them know how the business is doing and how they can progress and proceed with their business. In addition, they lack decision-making capabilities; they are using the numbers in Excel to figure out how much they sell and how much profit they make. However, they need a more delicate system that presents the information as a graph or useful interface. Therefore, a
BI technology consultant has conducted this research to help in recommending an information system strategy and introducing a BI tool for NM Ltd.

Therefore, a BI technology consultant’s first hand experiences, has conducted in this research to help in understanding BI, and to give advice to which business intelligence tool can be used for NM, Ltd case. Hessa has a Bachelor degree in business information system. She is working as an Engineer-Analytics and Visualization in Department of Medical Informatics in Sidra Medical and research centre, which is a centre specialized in paediatrics and women health. She has an experience with BI for almost two years. From her knowledge and experience with BI, she defines BI as a selection of software applications used to analyse organizations data, which helps in developing interactive and actionable data visualization products. She mentioned that, as BI helps big organizations make better business decisions, then it should be able to help small business make sound and effective decisions for their own businesses too. Small business can deploy BI to fulfil different needs, analyse their performance, predict their future, and make better decisions. She has an experience with using Microsoft Excel and Tableau, and she recommended Tableau to be used as a BI tool; she said that it is easy tool for anyone to use, regardless of technological know-how, to connect with data and create visual reports. The Tableau platform is simple as Excel, but it has very rich features – sharable dashboards, interactive reporting, flexible features, and scalability make for one-click access to any data you need to analyse. Moreover, Hessa mentioned that using BI tool is one of the useful techniques in any kind of organisation and small businesses. As it easily integrates the data sources together, it gives the business a great outcome and very visualisation dashboards which help to read and integrate the operational work of a business. Therefore, from the experience Hessa gained from Tableau, she stated that it is a good tool to integrate the data sources; in addition it has mobiles support. the excel user interface is curead further into a mobile devices and dashboard report are automatically mobile optimised using Tableau.
Discussion:
This section will discuss further how the result of the research study answers the research question.

1. Business Intelligence Model:

In hence to achieve a well-defined business intelligence technology, a business needs to follow a framework (figure 2). This framework serves as guidance for a business, as it defines each required step, which helps to reduce risk, concentration on readiness, direction, defining strategy, execution, minimize surprises, and defining the impact (Bravesoft. 2009). Therefore; enabling business to move forward and achieve its goal and needs.

![Figure 2: Business Intelligence Framework Model](Bravesoft. 2009)

Figure 2 illustrate the steps of developing a BI technology. The software system is analysed using this model which include three software life cycle stages of analysis. Firstly, the analysis start with project initiation, and then moveto Holistic BI assessment. Secondly, the analysis proceeds to the design phase which include: 1-discovering the need, 2-defining the
requirements, and 3- having a business view. The third and final stage is implementation, which include: building and implementing the software system, then checking the validation by testing the software, and finally Deploy which enable to establish the software system. Therefore, a software development lifecycle will help in reaching and defining a high quality software system, and to design a system that achieve customer satisfaction (Bravesoft. 2009).

2. Designing the Business Intelligence system:

4.1 Discovery:

From above mentioned case study it can be illustrated that Nine Months managers’ are facing difficulties in creating periodically reports, which helps them to follow their performance. The reports that have been created by the business owner required various manual works which led to time wasting. They created a simple database using Microsoft Excel which showed the execution of the business. The database did not define well their business performance. However, the invoices were paper based which led them to conclude with extra efforts; as they were spending time filling the invoices for each customer afterward transferring the invoices data intoExcel sheet. Furthermore, they had difficulty in converting a raw data into a meaningful data. The business co-founder did not know how productively their business was, how much they have consumed, and how their business being profitable. Therefore, the next section will discuss the client requirement; which will help in providing the right business intelligence system.
4.2 Requirements:

Gathering the client requirement, it is one of the important stages which will enhance in designing and building the system. Below are the points stating the client requirements needed for implementing a new system for Nine Months. Ltd:

- System that enable the co-founder to easily engage and enter the data.
- System that gives a figures that help in estimating the business future.
- Require to analysing their data and create structured database.
- System that introduces the collections data, in a very tacit way.
- Easy to interact and update.
- Enhancing the production.
- Easy to visualize and track the data.
- Enhance in decision making process.
- A system that focuses on Human Computer Interaction, that gives a high-quality system in which focus on the usability.
- Moreover, the clients request to build a dashboard which indicates Nine Months Ltd. Performance. Therefore, the next step will state the Key Performance Indicators.

4.3 Define Business Measures:

The Co-founder has provided the researcher with their business data to analyse and to give a well-defined software system. The data were analysed in order to concluded the best concept, to define the BI system, to define a business objectives or indicators, and to focus on to have the main factors to introduce in the designing interface. Therefore, this will help in defining the business measures that will indicate the Key Performance Indicators (KPIs). KPIs help in analysing the business view, that enables to create a business measures, to manage and analyse data (Klipfolio, 2017). By defining the KPIs this will allow the NM co-founder to enter the business data into one specially designed system for faster and more accurate data collection. Moreover, using one of the KPIs software allows business owner to visualize and comprehend data from number of indicators that represent different areas of the business (Klipfolio, 2017).
NM's KPI's will be defined and discussed in the following:

- Nine Months Annual Target, KPI's:
  
  The KPI's will mainly address the analysis of NM's data; as defining how the business being profitable, which will be based on a yearly examination. The business has two main focal points. The first point indicate the business production, examine how profitable is per-collection and examine the total profit of the collections. The second point is to examine a yearly profit target of NM's.

1. The first indicator will focus on NM's collections (or production):

   As that will be illustrated by analysing the selling target goals.

   - The first defined target is to introduce four collections and in the meantime they have produce two collections.
   - Each collection, for NM's has a target goal to achieve. The first collection target was to sell a 21 pieces of the dresses, and they only have sold just 7 dresses. The second collection target was to sell a 45 pieces of the dresses and they were able to sell 84 dresses. Therefore, this data will be defined more in an implemented interface to provide the CO-founder with a perfect visualization.

2. The second Indicator will focus on NM's Profit target:

   - NM's had set an annual profit target to achieve. Which is hundreds thousands Qatari Reyal. This will be address by analysing the total cost of the consuming and gaining.
4.4 Implementation:

In this section, a dashboard for NMs Ltd will be introduced, and will be defined in more detail by addressing the implementation procedure. The BI tool that has been used to achieve NMs requirements is Tableau software. According to Dana Zuber, Tableau is one of the best tools that can be used in any kind of sectors in these days, which helps in creating powerful and insightful visuals. Thus, Tableau is used for managing and analysing data through providing great data visuals. This helps the user to gain more understanding and knowledge of their data (Tableau Software. 2017). Thus Tableau provides business users an easy platform to implement and introduce a dashboard interface that helps make data analytics more powerful and engaging. Hence, the concept of implementing a dashboard has been easy to use with Tableau, this is the main benefit from using Tableau and defining features (Tableau Software. 2017).

- Cluster analysis: have a high standard feature, in which enable the user to quickly spot patterns and group the data with a drag-and-drop cluster analysis (Tableau Software. 2017).

- Cross-data Join: enable to join data from different data sources, such as SQL server and Oracle. On the other hand it enable the user to easily create their own integrated data source and share with other using the cloud (Tableau Software. 2017).

- Powerful data connectors: allows the user to faster connect and manage the data that has been generated in other software. In such giving the feature to directly connect with Excel sheets, Google Sheets, QuickBooks and others (Tableau Software. 2017).

- Delightful mobile: enables the user to design, customize, and publish a single dashboard. That includes optimized view with the use in different devices such tablet and phones (Tableau Software. 2017).

- Customer territories: give the features that enable the user to map the data and explore the data regionally (Tableau Software. 2017).
4.5 Implementation method:

To implement the software for NMs it took time, in a way to analyse and update the data that has been provided from the CO-founder Mariam. As the data was basic and simply generated in an Excel sheets, and a invoice booklet. Firstly, the missing product data has been added and documented in the Excel sheets. After ensuring that all the data are valid, available and well-defined in the excel sheet, the Tableau software has installed to start implementing the dashboard. And this will be discussed further in the next section.

4.6 Designing and building the dashboard:

Develop the Minimum Data Set (MDS)

Implement the software for NMs it requires to analyse the data that has been provided by the CO-founder Mariam. The data was basic and simply generated in an Excel sheets and in addition the invoices are paper based. However, after developing the KPIs a minimum data set has been created that collected data for a specific purpose. Figure 3 illustrate Nine Months MDS.

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Figure 3: Nine Months Minimum Date Set Model:
NM data set model shows minimum amount of data which is essential to build the Nine Months Executive Dashboard. The Fix Cost Table illustrates the NMs expenditure throughout the year which fixed amount that has no relationship with other tables. NM Pricing Table is the main table which will refer to it to indicate the profit, budget and each model or dress pricing details. NM Invoices table has one-to-many relationship with NM Pricing Table which will collect all related model details in the invoice. From NM Invoices table will indicate the number of sold dresses.

NM s data sources are three different excel workbooks have been created which are Fix Cost Table, NM Pricing Table and NM Invoices table. However, one of table benefit is that developers can easily join different data sources in one Tableau workbook to build on dashboard. There are two ways to combine different data sources in Tableau; one by using joining data by linking common fields in each table as shown in bellow figure 4. Second method is by using blend data which is “combining data that supplements a table of data from one data source with columns of data from another data source.” (Tableau, 2017). In this project a blend method used to combine Nine Months data sources in one dashboard.

![Figure 4: Tableau joining data](image)

Figure 4: Tableau joining data
Building the Dashboard:

1. Connect to the data source:

Figure 5 and 6 shows the starting point to build the dashboard. In figure 5 the developer start to connect to the server of excel file. Figure 6 the data source view where the developer can see the tables and join different sheets.

Figure 5: Tableau Connect View

Figure 6: Tableau Data Source View
2. Create the chart and tables

Chart in Tableaus are created using dimensions, measure and parameters. To measure Nine Months Annual KPIs different charts such as table and bar chart has been created. Moreover, a red down-arrow and green up-arrow used to give fast visual indicator if the leadership doing good or bad in meeting their targets.

Firstly, created the performance overall view for leadership to indicate the annual profit, collection and budget targets as shown in Figure 7.

![Figure 7: NMs annual performance overall view](image)

The leadership can indicate if each measure have meet the target of not. NMs annual profit target is to gain 150K Qatari Riyal the actual profit up to date is QR 49K. NMs need to gain 67% to meet their target. Second NMs annual launching collection target is to launch 4 collections the actual launched collection up to date 2. NMs need to deliver 2 more collections to meet their target by the end of the year. Third, NMs annual budget to spend 100K Qatari Riyal the actual spent budget is 19K Qatari Riyal in 2 collections. NMs are saving 81% of their budget of the remaining collections.
However, developer creates a comparison view between NMs collections.

![Figure 8: comparison view between NMs collections](image)

For each collection the leadership can illustrates the following collection KPIs:

- Measure 1 is the budget target for each collection.
- Measure 2 sold items for each collection and if they met their target.
- Measure 3 how many dress have been sold per model.

For example, in collection 1 the target budget to spent is 20K Qatari Riyal the actual amount is 12,465 QR which they are doing perfect in saving the money as the green up-arrow showed. Moreover, the target is to sell 3 dresses per model. NMs sold 7 dresses in this collection which they did not meet their target. However, the bar graph showed the number of sold dresses per model and black line is the reference line which the target.
Figure 9: Dashboard Interface

Figure 3. shows the final designed dashboard, as it has been designed to be very simple and easy to analyse. The fist table shows NMs yearly target, illustrate that if the business has meet the business profit target or not, the collection production target, and shows the Budget target. However the two tables, in the bottom of the interface show the data analysis for per-collection. One of the difficulties in designing the dashboard is to simplify data visualization. With designing the dashboard they become overly complex in which the designed dashboard interface present too many charts and graphs that might lead to have some confusions and hard to interact. Therefore, deigning a dashboard using Tableau will help address this issue by having a simplified dashboard.
3. Validation:

After completing from designing the dashboard we need to ensure that the numbers are accurate. Testing stage come next which help to solve any issue before publishing the dashboard. The testing has been done by the following to steps:

- First step validated the numbers in dashboard with the clients database in excel sheet by matching the numbers.
- Second, validated the dashboard with the client and checked if it meets their requirements by going through their requirements list. Checked the layout of the dashboard for example: the type of graph, the colours and the structure.
- Thirdly, fix any issue have been defined and validated again with the client.
- Finally if the client is satisfied with the dashboard the next step will be publish the dashboard to Tableau server.

4. Deploy & Support:

After testing the system and ensuring that the system has meet the CO-founder satisfaction the system can be published on Tableau websites and then employee will have the access to Tableau to track their performance. Offering the clients with a further support by set a training sessions to explain how they can use Tableau. Furthermore, system developer can provide a frequent maintenance to the dashboard.

5. Area of improvement:

This section will address further advices for NMs to improve:

The company need to assign an employee that have an experience in IT that encourage him to express a further support to the business database system. For instance, assigning IT analytic for NMs will relives the responsibilities at the CO-founder, and them the
system can be continually updated, analysed and modified. Thus, there will reduce the ability of having missed and unstructured data.

Chapter 5: Conclusion

As a result, this research study has a justification to how BI can be implemented and used within a small business strategy. Therefore, the chosen BI tool which is tableau has addresses that BI can be easily conducted and used in a small business.
References


Appendices A:

<table>
<thead>
<tr>
<th>Theme</th>
<th>A : Adaptation</th>
<th>B : Problem Solving</th>
<th>C : Seeking Information</th>
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Appendices B:

- Theme
  - IT analyst
  - BI experience
  - Defining BI
  - BI in small business
  - Tableau BI tool

The researcher:

Good afternoon Hessa I would like to make an interview with you regarding your experience BI business intelligence and discussing your current carer and current experience with BI.

The researcher:

(question)

firstly, could you please introduce yourself.

Interviewer:

(Answer)

Thank you, Aisha, for the invite. I am glad to be part of your studies. I am Hessa Almulla, Graduated from Cardiff metropolitan university in 2014 with a Bachelor degree in business information system. In fact, I would like to thank CMU provided me with the right education and skills that reflected in my job. However, after I came back to my country Qatar. I have started my career path in 2015 in one of the important healthcare centre at Qatar called Sidra Medical and research centre specialized in paediatrics and women. I have joined IT -
Clinical Application Services Department as Analyst in reporting. Currently, I have been promoted to Engineer - Analytics and Visualization in Department of Medical Informatics.

The researcher:
(question)
How many years you have been working as an IT analysis, or how many years you have experience on BI in general?

Interviewer:
(Answer)
I have been working as IT analyst for two years. And I have the experience with BI for almost two years.

The researcher:
(question)
What do you know about business Intelligence and from your point of view how BI can aid small businesses?

Interviewer:
(Answer)
BI is a selection of software applications used to analyse organizations data which helps develop interactive and actionable data visualization products. In fact, If it helps big organizations make better business decisions, then it should be able to help small business make sound and effective decisions for their businesses too. Small business can deploy BI to fulfil different needs, analyse their performance, predict their future, and make better decisions.

The researcher:
(question)
the next question is what and how is your experience with BI in large cooperation and small cooperation?

Interviewer:
(Answer)
using Tableau provides an extensive roster of native data connections allowing easy integration with data from many sources. in small businesses, we don’t have many data, but it is also it useful and easy to use as a tool comparing with Microsoft excel, which i previously I am using is not very easy to update as but
in Tableau it like easy to improve or create a dashboard for any kind of report for both large and small cooperation.

The researcher:
(question)

Have you got in experience with the bi tool?

Interviewer:
(Answer)

yeah, as i have said I am using in the current time tableau to crate and publish dashboard and previously i was using excel to create the report. now I am using tableau which is a big different and is a perfect and excellent tool to use.

The researcher:
(question)

from your point of view What are the top BI tools do you think in general is useful l?

Interviewer:
(Answer)

from my study and research the top four tools are Oracle, SAP Business Intelligence, Tableau and IBM.

The researcher:
(question)

Which tools you find it more useful and flexible for small businesses?

Interviewer:
(Answer)

I recommend Tableau as a tool to use, I found it easy tool for anyone, regardless of technological know-how, to connect with data and create visual reports. The platform is as simple to use as Excel, but is very feature rich – sharable dashboards, interactive reporting, flexible features, and scalability make for one-click access to any data you need to analyse.

The researcher:
(question)

How you find BI tools useful for organizations and would it help small businesses? (What are the best aspects or experiences?)

Interviewer:
(Answer)
So, BI tools an useful tool to use any kind of organisation and small businesses. as i said like it is easy to integrate the data sources together, it's like give you an outcome and a very visualisation dashboards which help to read and integrates an operational work of your business. so from my experience tableau is a good tool to integrate the data sources and also tableau had the mobiles support. the excel user interface is curead further into a mobile devices and dashboard report are automatically mobile optimised using tableau.

The researcher:
(question)
Are there any limitations or disadvantages of using BI tools?

Interviewer:
(Answer)

From my experience, I didn’t find any disadvantages. However small business they might find it difficult to implement BI: Companies need to have strong technical skills to build the initial structure. This is typically done by IT or a consulting organization. Once the integration with the data source is done, however users with no or very little SQL knowledge can also access the tool create the dashboards and analyse data.

The researcher:

Thank you Hessa for being peasant and this is the end of the interview.
Appendices C:

Theme:
- Nine Months Maternity company
- Co-Founder of Nine months
- Limited product
- Selling product on store and Instagram
- Customer satisfaction
- Bill sheet and Bill booklet
- Microsoft Excel.
- Lack of decision making support.
- The need of BI tool

The researcher:

Hi, Mariam, I would Like to make an interview with you regarding your business Nine Months and we are going to start first by knowing more about yourself and your business.

The researcher:

(Question) Firstly, can you please introduce yourself?

Interviewer:

(Answer)

I am Mariam Al-Mulla I am a co-founder of Nine Months, which a co-founder of Nine and a designer for Nine Months. I am currently having a full-time job as a genetics counsellor in Hamad General Hospital in Qatar and, I am directing and designing for Nine Months.

The researcher:

(Question) Can you tell us more about your role in Nine Months?

Interviewer:

(Answer)

As I said I am managing and designing for nine months, so in a way is like I am designing for the collection per season and then I am directing and managing the selling process and production process.

The researcher:
Can you just be telling us more about what is Nine Months(NM) and what is the main target from your business?

The idea of NM started when I was pregnant, at that time it was difficult for me to find dresses that can fit me where I am pregnant and having maternity dresses. so, as I am very well and good in designing for other kind dresses and I had an idea just to start a business in design maternity dresses and I asked one of my friend she is very good in design gowns as well to have a collaboration together and to start a business just delectated and just for pregnant ladies. So, I am designing for evening dresses during pregnancy and my friend is responsible for design after pregnancy gowns. the idea from evening dresses is having only a limited piece of dresses and let say per dress if we have seven outfits from each outfit we just sell 3 pieces. and for after pregnancy gowns we are selling more than 3 pieces it by request. the name of NM comes from the Idea of the pregnancy months’ duration, we are aiming to be with the pregnant lady during her pregnancy and after her pregnancy.

How are you using to sell the business products?

Currently we are selling our product in multi brand store in the one of the luxuriance places in Qatar named the pearl, the store name is dress me. but before that we are started introducing and broadcasting our product through Instagram but now in multi brand store in the pearl Qatar.

Regarding, business analyze process and problems. Dose the business meet customer need.?
So, from the products yes. as from the feedback we have got they love the dresses and they love the designs and the only thing is that they continuity as like we are providing product per season. and like let say a small business run by two of director, the production and the number of the collections are limited the pregnant ladies might need more collections per year, and we are trying to meet this in the future.

The researcher:
(Question) Regarding the database system. do you use any reporting system?

Interviewer:
(Answer)
Regarding reporting system, we are using to follow the selling and what we are selling is by following the bill booklet, and we have bill sheets and from there we are following what we sell. but regarding what we've spent and what we've boat and the sillier we are just entering it into Excel sheet.

The researcher:
(Question) Is the business data being up to date and help you in developing and achieving business target?

Interviewer:
(Answer)
It is very simple, our, excel sheet is very simple we need something much easier to use, like easy accessible and updated so we can entire data and gives as figures that help us know how are the business going and how we can process and proceed with our business.

The researcher:
(Question) And in case of decision making is the current data reporting method aid on decision making process?

Interviewer:
(Answer)
NO, we don’t have any tools that help us in decision making we are using the numbers to know how much we sell and how much our profit, but as more delicate system no we don’t have.
Thank you, Mariam.