A framework for understanding the impact of Business intelligent systems in optimized decision making and organization performance

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ABSTRACT
At Company C there are challenges related to a lack of a centrally managed database. Its business processes are segregated and some are still manual. It still provides basic reports that are static and lack the analysis and visualization capabilities that come with business intelligence (BI). As a result Company C is not able to arrive at optimal decisions and returns. Company C currently does not have effective BI systems in place. A BI tool has been proposed to support systems at Company C to in order to achieve optimal business decisions. This study used primary and secondary data sources. Mixed methods were used. Focus group interviews and a survey method were used to collect data. This study produced a high-level BI Framework for increased optimized decision making and organisation performance. This framework will benefit Company C and related organizations to serve their customers well.

Keywords- Insurance value chain, BI, optimized decision making, organization performance, framework.

1. INTRODUCTION

Company C is in the insurance industry. Many of its systems work in silos and in most cases they collect the same data differently. Put another way, business units that include investments, medical, vehicle insurance each hold their own version of data (that is at times) similar to what the others hold and this causes redundancy and a risk of having inaccurate data. Since the systems do not communicate with each other, it is quite possible that one client for example can be a teacher under vehicle insurance and then also a dentist in investments, as there is no way of tracking up. Clients are always subjected to having to submit the same data to the same company consistently. In addition, data at Company C is not centralised and thus decisions are not made from the same version of data and this results in suboptimal decisions. Having a centralised data store ensures that one version of the truth is portrayed throughout the entire organisation. Furthermore, there is no one standard that is defined across systems to ensure that all business users are using the system for computations in the same way. This results in inconsistency in data being used to make critical decisions and hence poor company performance. There exists a great amount of segregation and manual work required in the day to day workings in the business units. There is no centrally managed database and as a result with each product chosen by customers, the customer must always provide the same details they will have provided to other business units. This can be a bit annoying to the customer and it can also result in limited reporting capabilities. Most of the reports at Company C are still static and basic and do not provide real-time analysis and visualization capabilities that come with BI tools. This results in increased cost and time lost, since employees are not able to complete their tasks during business hours. These employees have to work overtime to complete cases. Employees working after hours need to be paid for overtime and this also increases the use of electricity in the building, a consequence caused by the waiting for data. Thus the information derived from this data is dated and it does not enable the company to get insight on current trends and future market directions on time and the result is delayed and poor decision making. Properly implementing BI at company C might be useful. Currently, Company C provides little to no presence of BI systems. Here each BI system has its own data mart which are not integrated into a data warehouse (which is a combination of all the data marts) which houses historical data and current data. BI involves collecting quality data based on a specific matter. In BI [6] state that data is transformed into information and then knowledge. This knowledge assists decision makers to arrive at informed business decisions and thus improve the performance of a business.

Currently issues that potentially have a negative impact on Company C realising benefits from BI are:

- Trying to manage unrelated old systems that do not communicate and work with each other.
- Using traditional methods which are dated and do not meet the needs of Company C anymore.
- Lack of BI systems that are pervasive within the organisation.
The challenge has been quantifying the value created by BI in organisations and computing the expected return on investments (ROI) of BI projects [3] Despite the advent of BI some organisations still rely on excel spreadsheet and access databases for information [8]. However, risks associated with the use of excel sheets include the following:

- It is time consuming to compile the data
- Manipulating the data is difficult and time consuming and is susceptible to user errors
- Different truths of spreadsheet compiled from different business units.
- Access is only granted to a certain number of people rather than all who need it.
- As the database grows bigger, compiling reports becomes difficult to implement as spreadsheets are not scalable.

The benefits of implementing BI of has to an organisation [8] include:

- It offers one view across the company that can be viewed by all the relevant associates.
- It provides a single source for reporting accurate information.
- Flexibility with regards to what data each individual requires
- It provides scalability as the organisation grows and so is the database.
- It provides a view of the organisation’s performance and new opportunities that are available to the organisation

Over 44% of respondents stated that BI systems enabled them to maximise how they do business [2]. Company ANZ [2] has established that BI systems could focus on analysis and improving processes rather than wasting time trying to fix the reports. The implementation of BI systems for dashboards by Plantronics [2] has enabled it to have precise graphical representation of an opportunity pipeline that is used in making decisions on where to allocate sales resources for profitable business, customer satisfaction and saving on time and money. Maidenform retail [2] used BI systems to provide them with information that is specific to the time and date [2] and thus improved the decision-making process. The result was increased sales and customer satisfaction. Oil companies benefited in the decision-making process. The result was increased sales and saving on time and money. Maidenform retail [2] used BI systems to provide them with information that is specific to the time and date [2] and thus improved the decision-making process. The result was increased sales and customer satisfaction. Oil companies benefited in the decision-making process. The result was increased sales and saving on time and money.

In this paper, using qualitative semi-structured group interviews and a quantitative self-administered cross-sectional survey, an in-depth insight into Company C and its use of systems was obtained. A BI framework for optimized decision making that will potentially increase the performance of Company C was developed.

2. MATERIALS AND METHODS

The literature reviews and secondary data and qualitative methods in the form of semi-structured interviews, were used. Qualitative methods were used as the foundation for quantitative methods [5]. Qualitative methods were viewed as potentially consolidating in-depth insight from individuals in various roles at Company C. This was useful in designing and tailoring the framework to the organisation [11]. A descriptive understanding for those areas within the problem domain that could not be quantified was used. The sample unit included the Chief Technology Officers CTO), Executive of R&D, Executive of Underwriting and Claims, Senior Manager Business Processes and Executive of Investments and Senior Management of the different business units at Company C. These are individuals who held multiple roles work closely with the data management and processes that deliver business objectives. The sample unit was engaged through semi-structured interviews to gain understanding of the use of BI systems within the business areas in Company C and effects thereof. The critical success factors (CSFs) related to different business units at Company C were to be identified. A set of themed questions were asked based on different business units and roles. The order of questions varied and was dependent on the flow of the conversation. Room was left to explore additional questions that may have arisen within the interview. The discussion was recorded on audio and note-taking was done with the permission from the interviewee. The collection of data from fewer cases avoided more time to effectively design and pilot the data collection tools and give an in-depth analysis of data [9].

3. DATA COLLECTION

The data collected from these interviews also included voice and video recordings and these assisted in the designing of the framework in Figure 10.

Company documentation and diagrams, company history, reports, minutes from meetings, journals, books, magazines and conference proceedings were used to augment the response gathered from the interviews. Although secondary data had been generated without this paper in mind, it was useful for constructing the framework. The hurdle was access restrictions to some documents due to the sensitive nature of data they held.

Thematic analysis was used in this paper. It involves putting data into related themes [1] in order to get insights from the data. These themes were used as input for designing a BI framework.

A self-administered cross-sectional survey was made available on the internet and also delivered by hand. This survey was distributed to staff of the identified business units at Company C. Unlike in semi-structured interviews where one could explore issues more extensively, with the
survey one only gets one opportunity to collect data. Data that was to be collected had to be relevant to answer research questions. This survey gave insights on Company C at a specific point in time. Data collected from a survey was used to determine relationships between variables. The questions that were asked were related to BI systems and its impact on the CSFs for Company C in optimized decision making and organization performance. Questions relating to the current BI maturity adopted by the organization and the steps taken to ensure successful and effective implementation of the BI investment were asked.

4. EXPERIMENTATION

The work focussed on the impact of BI systems in optimized decision making and organisation performance in Company C. The sample unit was the heads of units and operational workers. The interviews with the staff (who work with the tools and data) of Company C explored their experiences, beliefs and views on factors that influence their decision making. The interviews were semi structured and were held in a relaxed and secluded environment so interviewees could open up. These interviews were meant to provide a ‘deeper’ insights which complemented quantitative methods on what was on paper and the reality in the units. The insights are based on individuals’ experience when making decisions, the BI tools available to them and the impact of these tools on the company performance. Unlike quantitative methods, with interviews individuals could expand their answers. The interviewees were notified that the interview would be recorded (using a smart phone) for documenting purposes only and anonymity was assured. Four questions were predesigned to lead the conversations although not limited to just those questions. Question one aimed to understand the purpose of the different units. This would enable the researcher to know the expected deliverables and if they are achievable through the available business tools. Question two was aimed at understanding the strategic goals of each unit, to understand the available tools with regard to enabling the units to align to strategic goals. Question three elicited a list of the business tools currently available and their functions in the different units, the kind of intelligence these tools have and the purpose they serve. Question four was aimed at gauging the effectiveness of these business tools in assisting with optimal decision making and organisation performance.

A self-administered cross-sectional survey was administered to employees of the identified business units that include, investments, underwriting and claims, research development and new business. This was done in order to ensure that a wider range of employees was covered to get a clear view of the system. Surveys were also sent to the sample group via email and or physical copy depending on respondent’s preference. The survey was sent on a Monday morning in order to eliminate participant error. A survey done on Friday after a long week may yield different results as respondents are likely to be tired and thus uninterested. The participants’ anonymity was ensured throughout data collection process.

4.1 PRE-PROCESSING OF DATA

Pre-processing of the data involved transcribing narratives of each interview and then extracting a set of CSFs as shown in Figure 1.

Figure 1: Process followed in pre-processing data from the interviews

Themes also called patterns were identified from the variables extracted from the interviews as shown in Figure 1. Words were used to describe the sentence at the same time ensuring it did not lose its original meaning. An example is the variable links shown in Figure 9. Silo units theme which was consolidated into a CSF of having units in the organisation that are transparent with the work each does to service the client better. The identified CSFs were verified with the interviewees in order to eliminate researcher’s bias.

Thematic analysis was used to identify, categorize and present themes [4]. It is a tool for interpreting data [4] and for understanding the problem. It counts explicit words or phrases but also focuses on identifying and describing implicit and explicit ideas [7]. Codes developed for ideas or themes were applied or linked to raw data as summary markers for later analysis. This included comparing the relative frequencies of the themes or topics within a data set, looking for code co-occurrences or graphically displaying code relationships. It was used for identifying the relationships that existed between concepts and the collected data. It can be used for linking and comparing opinions in collected data.

CSFs and related themes for 3 business units, as an example, are shown in the tables that follow.
The level of experience when it comes to using data reporting tools from the employees helped in determining who is more likely to adopt BI systems. This helped to understand how informed employees were when it came to business tools and what they do.

### 3.2 Results

In Figure 2, results that a significant percentage of employees are experienced in data reporting tools and this means that it would be easy for Company C to adopt these tools.

Company C collects data from its operations and some of this data is analysed to inform decision making while some is not analysed. Questions were asked to obtain the level of experience of the participants, the role they played, the impact decisions from insights from data on the business and the impact of time spent waiting for data to make these decisions.

In Figure 3, the results show an equal number of employees being either experts or beginners. This puts Company C in a positive position to develop beginners and use the experienced knowledge of the experts to develop tools that meet the needs of business.
Figure 4: User roles

Figure 5: Hours waiting for data

In Figure 4, most employees take a role or are decision makers in their business unit. Their decision is impacted by the number of hours they spend waiting for data as shown in Figure 5.

In Figure 6, data is useful to a decision making process and it has an impact on business as shown in Figure 7.

Business effectiveness is based on the systems ability to provide what is required as and when it is required and in a certain format. In Figure 8, when the decisions on the software tools were made they excluded opinions of the people who actually use the software to generate income for Company C and thus the needs of the employees were not met by the systems and time was spent trying to analyse and figure out data for critical decision making.

Figure 7: Impact decisions have on business

In Figure 7 results mean that most of the decisions that positively impact business are from insight derived from data.

Results in Figure 8 mean that Company C did not involve users in the selection of the software used in their units and hence the needs of the employees were into met.

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Results in the form of Variables

The variables hindering the teams from reaching optimal decision making and organisation performance identified from interviews include the following:

- **Variable 1**: Silo Units
- **Variable 2**: No Central Storage
- **Variable 3**: Slow performance of tools
- **Variable 4**: hours spent looking for data
- **Variable 5**: Number of hours waiting for data,
- **Variable 6**: Not enough staff
Variable 7: Inadequacy of business tools.

Figure 9: Linkages between the identified common variables.

The results in Figure 9 show how the key variables at Company C interact with each other within the various units. Figure 1-8 results show a gap in the system.

Due to a lack of a central data store employees who are responsible for decision making at Company C shown in Figure 4 and Figure 6, must wait for analysed data shown in Figure 5. This wait is a result of a combination of factors such as the slow performance tools, trying to locate where the data is stored due to silo business units that house their own version of data. These decisions have an impact on business as shown in Figure 7.

Most employees in Company C are experienced as shown in Figure 3 and have worked with business tools shown in Figure 2. Thus they have a better view as to which business tools would meet their needs.

Most units in Company C have adopted a silo mentality (variable 1), where each unit operates with its own data and its own BI tools. The silo mindset has been identified as a struggle with inter-business unit alignment and communication which stems from a conflicted leadership. This lack of a united vision at Company C is problematic. This study is aware that different units require different information from clients to achieve their goals. Thus due to lack of a central storage (variable 2) customers are being asked to provide the same information to different units in the same organisation, e.g. in life insurance, investments units etc. This results in poor customer experience. In most cases, employees at Company C struggle to get access to data from other units for optimized decision making. Thus production time is spent looking for data (variable 4) and once located, tens of hours are spent waiting for the data to be made available. This delay negatively impacts on decision making and organisation performance.

In the interviews employees stated that they were not involved in the selection of business tools. It turned out that most of the business tools being used are either manual or inadequate to serve the purpose. In addition, due to the silo mentality of units, it is difficult to get adequate data as the tools do not speak to multiple sources.

The results from interviews mean that the volume of work for Company C is huge and there is a critical shortage of staff which affects the number of hours waiting for the data to be made available to units who need it.

Other identified variables included poor leadership and old technologies (infrastructure). And a lack of the following: Communication in teams, a Project Office involvement in project life cycles, a shared vision, specialized professionals to support specific technologies, proper documentation, knowledge sharing in teams, CRM and enterprise architecture for the organisation as identified in the interviews with management.

5. DISCUSSION

The results mean that most of the decisions that positively impact business are from insight derived from data. The results also mean that it would be easy for Company C to adopt data reporting tools as most employees are experienced in using them. They also mean that most of the decisions that positively impact business are from insight derived from data. The results also mean that a lack of employee involvement in selecting tools results in more time spent trying to analyse and figure out data for critical decision making.

The results are what they are because the sample unit did not give data that they considered to be too sensitive. This affected the form that the framework, Figure 9 took. A better framework could have been achieved than one shown in Figure 9. The selection of software tools is done outside the business units and does not include the teams who will utilize the software. As a result, there exist an inadequacy of business tools within Company C. Thus their software does not proactively meet the needs of the business.

Company C is in the insurance sector and thus it must ensure that the decision such as loading, risk profiling, paying claims among other functions is done using the correct information to ensure optimized decision making. Withholding sensitive data meant that a suboptimal framework was constructed which might not be useful to the insurance industry. The survey and interviews revealed that the current systems are slow and not effective in providing the required data. Put in other words, decision makers do not have access to real-time data. Users spend time figuring out where the data is and at times they do not have access to it or have to request extracts in spreadsheets. Thus employees are working with limited data to come up with a system that assists them to perform their jobs well.

There have been many instances where business was lost and opportunities missed, because the data was not
available at the time it was required to decide. This negatively impacts on business in terms of the cost of missing new business opportunities and employees having to work overtime resulting as a result of business hours lost waiting for data.

The framework developed in this paper will benefit Company C and related organizations by enabling them to serve their customers well.

6. CONCLUSION

A framework to aid organisations in optimized business decisions and improving organisation performance has been developed. The current tools being used in Company C provide a certain level of decision making and organisation performance, however, results show that the implementation BI as a company wide practice rather than just in ‘some units’ is useful.

Implementing BI system is a continuous procedure. We made the recommendations as a starting point to get the company moving to be an organisation that is BI Driven.

RECOMMENDATIONS

Company C should consider implementing a company wide BI strategy to optimize business decisions and organisation performance. In addition Company C must

- Set standards and procedures to ensure business consistency
  - Training staff to follow the standards and procedures
  - Automate work that can be automated and reduce manual interventions.
  - Implement a central location for data
  - Align systems to work together

7. REFERENCES


