
THE NEEDS AND CHALLENGES OF ADOPTING BUSINESS INTELLIGENCE FOR SMALL AND MEDIUM-SIZED ENTERPRISE (SME)

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ABSTRACT

Nowadays, managing business performance is becoming a relatively difficult and complex process for managers since it is undertaking major change both in research and practice. With the growing global interest in Business intelligence (BI), it has also been identified as an important role for small and medium-sized enterprises (SMEs) to satisfy their customer's needs by analyzing through BI system. However, the limited financial resource and lack of human capital are becoming the constraint for SMEs to invest in Business Intelligence system; as well the return of their investment in BI system is still being considerable for SMEs to invest in the system. This study proposes an innovative approach for assessing and prioritizing the use of BI, which can help SME owners to prioritize their customer's needs and communicate with their stakeholder by using Kano model. This paper is prepared in a way to define and convey the idea of Kano Model and its application to aspiring organizations.

Keywords: Business Intelligence, SME, KANO Model

INTRODUCTION

The advent of computing and internet technologies has facilitated collection of a large volume of heterogeneous data from multiple sources on an ongoing basis posing new challenges and opportunities for business intelligence (Ram et al. 2016). The current situation of organization settings is complex and continuously evolving. Both public and private parts are under monstrous pressure to show innovation and evolution to the top administration in the organizations. In this quickly advancing scenario, the abundance of improvement opportunities is remarkable. Right now, we are seeing a conjunction of practices and technologies into smarter computing capacities that empower organizations to fulfill intelligent activities to address time-sensitive business process and advantages from analytics. There are simple ways to get access to information and knowledge which can offer some benefits to different actors in the socio-economic environment. Today, firms can no longer depend just only on low-cost and high volume production to maintain the market growth or survive in the market; however, they can

instead pay more attention into finding ways to meet their customer needs or customer requirements (CRs) and to obtain the customer satisfaction to keep on the competitive advantage in the market.

To achieve a better understanding of CRs, there are different methods and tools to assist companies. Kano model is one among them, which is popularly used tool for understanding the customer's need and their impact on customer satisfaction. Nevertheless, it will contribute to customer satisfaction by different CRs (Ting and Ping, 2010).

Increase in organizations competitive power is one of advantages of business intelligence solutions that make the organization distinguishable. Furthermore, it provides better understanding of management of communication with customers and customer's need. Apart from that, it helps the firm to oversee the positive and negative changes and properly control it (IGI Global 2015). BI is increasingly viewed as strategic initiatives for businesses to step change their performance. As SMEs, must continuously maximize productive efficiencies for endurance and improvement or to face acquisition/consolidation by conglomerates especially in the background of increasing cost of inputs (manpower, commodity, etc.), these challenges make BI very important for them (Pahwa, n.d.)

SMEs don't have deep and endless pockets like the large corporations; they cannot afford even small mistakes. They need to keep innovating to remain competitive at all levels. To fuel innovation within the organization, it's necessary to have a sound enterprise intelligence strategy in place (Shrivastava, 2008).

The most common challenges for SME are limited budgets, lack of sophistication and knowledge management in organization, technology, and small number of employees and, thus, have less time to employ on crucial planning and analysis. Nevertheless, if the SME that can overcome the challenges will get the potential benefits. They include: aggregating data from different sources and locations, analysis and insight from that data, improved decision-making, and risk mitigation. Ultimately, SMEs that install BI find themselves more effective in the marketplace, with additional insight in customer's buying patterns and needs, and therefore they operate with more efficiently in financial management.

For many SMEs, decision-support tools turn out to be some combination of static reports, analysis spreadsheets, and gut feeling. This methodology may work and easily manage in small organizations. However, as firms grow or face tough competition, the proper decision-making that is constructed on meaningful information quickly becomes an imperative; succession planning places extra pressure on a firm to show it is a well-managed business (Canes, n.d.).

The cycle times are shorter and one needs to be able to predict 'situations' as well as respond quickly to them. It is a must for all SMEs to have BI to understand market trends for their products and services (Shrivastava, 2008).

Over the most recent couple of years, dubious and turbulent economic conditions have constrained organizations, such as small and big ones, are forced to find ways for streamlining the operations and cost cutting in many areas (Östling & Fredriksson, 2012; Sheikh, 2011). Moreover, the

increase in the amount of data calls for an effective way of handling data especially in SMEs where the use of IT has consistent lag (Rath et al., n.d.).

The initiation of cloud computing generates a breakthrough in the IT section since the leverages conveyed in by this technology are particularly engaging to SMEs, and it possibly provides a solution for the two issues above-mentioned (Benlian et al., 2009). According to Rath et al. (2012, p.3), following is an excerpt of the most significant:

- *Limited financial risk:* Cloud solutions are commonly considered as low implementation costs; affordable monthly subscriptions that guarantee the use of the service, limited hardware costs and the possibility to cancel the contract at any time (Finch, 2007; Sheikh, 2011).
- *An efficient way to manage the information:* Cloud computing, supports continuous broadband availability (Sheikh, 2011), that helps in managing the information in a ubiquitous and pervasive manner, across different platforms and applications (Doukas, Pliakas & Maglogiannis, 2010)
- *The ease-of-use* of cloud software removes the technical drawbacks that might exist in SMEs, which might not have skilled people, who are able to use multifaceted IT systems. Cloud software can be effortlessly managed by both starters and advanced users (Sheikh, 2011).

Agostini and Florèn (2013, p.11) state that the bulk of studies on Critical Success Factors have been heavily focused on big firms and it is assumed that not all the factors can be applicable to the SME environment.

LITERATURE REVIEW

1. Business Intelligence

Business Intelligence may be defined as a “set of mathematical models and analysis methodologies that systematically exploit the available data to retrieve information and knowledge management beneficial in supporting complex decision-making processes” (Vercellis, 2009, p.3). BI, according to Natasha et al. (2015), can be defined as a system combining gathered data, data storage, and knowledge management with analytical tools to present complex internal and competitive information to planners and decision makers.

BI is considered as the ability to extract the internal and external data available to a company, for the target of supporting decision making and improving corporate performance. (Canes n.d., p.4)

BI helps administrators by breaking down information from various resources in better basic leadership at both tactical and strategic level, for customary utilization, conventional data frameworks farewell, yet for hierarchical and functional planning; new tools are required for business analysis (Rasoul and Mohammad, 2016, p.1).

1.1 Business Intelligence Architectures

Data sources. In a first stage, it is essential to collect and integrate the data kept in the different primary and secondary sources, which are heterogeneous in origin and type. We can find most sources of the data in the operational system, but may also include unstructured data, such as emails and data received from external providers. Generally, speaking a major effort is required to unify and integrate the different data sources.

Data warehouses and data marts. By using mining and transferring tools known as extract, transform, load (ETL), the data originating from the different sources are stored in databases intended to support business intelligence analyses. These databases are usually referred to as data warehouses and data marts.

1.2 Business Intelligence Methodologies

Data are mined and used to run mathematical models and analysis approaches proposed to support decision makers. In a business intelligence system, several decision support applications may be implemented, most of which will be described in the following chapters:

- Multidimensional cube analysis.
- Exploratory data analysis
- Time series analysis;
- Inductive learning models for data mining;
- Optimization models.

A further relevant enabling factor derives from the exponential increase in the capacity of mass storage devices, again at decreasing costs, enabling any organization to store terabytes of data for business intelligence systems. And network connectivity, in the form of Extranets or Intranets, has played a primary role in the diffusion within organizations of information and knowledge extracted from business intelligence systems. Finally, the easy integration of hardware and software purchased by different suppliers, or developed internally by an organization, is a further relevant factor affecting the diffusion of data analysis tools. The mere visualization of the data according to timely and flexible logical views plays a relevant role in facilitating the decision-making process (Vercellis, 2009).

Agostini and Florèn mention referring to (Nyblom et al., 2012, p.1) that “today's competitive environment, Business Intelligence software systems have become a central concept”. In the competition that exists, it is significant for a company to have effective and efficient software systems to gather, process and store different kinds of data such as a system for customer management, finance, sales monitoring and etc.

2. Small and Medium-sized Enterprise (SME)

An exclusive definition of small and medium enterprise has not been decided yet (Carter and Jones, 2006) and, in order to proceed further in this study, a company is considered i.e. a SME and see if it fulfills the following requirements.

- Up to 500 employees and \$25 M in annual revenue in the Unites States (Carter and Jones, 2006)
- Less than 250 employees; a maximum annual turnover of €50 million for European enterprises (Carter and Jones, 2006).
- For enterprises in Asia, there is no an official definition of SME. It is different from one country to another country. For instance, Chinese enterprises with 2000 workers can still be considered medium enterprises, whereas, in Lao, a firm with more than 100 workers is considered a big enterprise (Harvie, 2004; Xiangfeng, 2007).
- SMEs play a crucial role in the economy of many countries. Furthermore, just like big firms, SMEs have to establish their own business strategies, and then define the

level of their realization. It needs to define and to continuously measure the metrics and key performance indicators that will be the basis for future decisions (Muryjas, 2014).

For the SME, communication is critically important, specifically in terms of documentation, because employees frequently wear multiple hats and when someone leaves the company, their replacement needs to know those same things (Canes, n.d.).

For the SME contending in an undeniably information driven market, the capacity to access and process data with speed and precision is essential. Regardless of whether in recessionary circumstances or not, it is progressively essential for the SME to productively aggregate data from a wide variety of sources, including non-customary ones, such as emails and networking sites.

3. BI Adoption in SME

It is uncovered that most critical key adoption factors that SMEs assess when buying a cloud BI solution are the level of software functionalities, the unavoidable access to data, the responsive answers to customer requests for, the ability to manage tremendous measure of information and the usage cost.

Understanding the real needs of SMEs in terms of managing the information, through the adoption of BI systems, must be done in a more comprehensive way. The “use” of information has a great influence on the performance of SMEs (Lybaert 1998 found in Scholz et al., 2010). Therefore, to obtain the competitive advantage is not only through the innovation in markets or products, but also gathering, processing and analyzing the information has become a new way to reach the competitive advantage for the firm, as well as some researchers forecast that data will be a new corporate asset and main source of revenue for the firm (Brown et al., 2011; Raisinghani, 2004).

Although big firms have led the way in introducing and implementing BI solutions, the recent growth of globalization, competition and the amount of data to be processed has pushed SMEs to assess the purchase of BI tools (Olszak and Ziemia, 2012). These software applications do help a small business compete with larger ones, increase market share or provide insights and patterns that otherwise cannot be seen (Olszak and Ziemia, 2012) surveyed business-owners and managers of SMEs, who confirmed the importance of analyzing data even in a small company. These are the benefits of SMEs by adopting BI in their firm:

- Aggregating data from different sources and locations
- Analysis and insight from that data
- Improved decision-making
- Risk mitigation

Ultimately, SMEs that install BI discover they can compete effectively in the commercial center, with extra understanding into customers purchasing patterns and needs, and with more proficient financial administration. In this way, if SMEs can discover approaches to effectively send cloud BI frameworks, it is sensible to accept that those solutions will boost their market competitiveness and provide a way to manage the information in a more efficient way (Agostini and Florèn, 2013). The key adoption factors are explained in descending order Figure 1.

Order	Key adoption factors
1	The level of functionalities and capabilities offered by the product
2	Ubiquitous access to data
3	Responsiveness to general support requests
4	The ability to manage different amount of data
5	The amount of Implementation cost (Training, setup..)
6	Ability to share reports through the software web interface
7	The speed of the product in performing analyses
8	The effort required to deploy the product on a large scale basis
9	The level of customization and personalization
10	The amount Subscription cost (Monthly or Yearly fee)
11	Level of integration with other BI applications or databases
12	Ability to offer actionable insights
13	The level of security guaranteed by the vendor (Backup, Recovery and privacy)
14	Vendor's clarity to customer support requests
15	Provider's brand reputation (Including partners, suppliers and testimonials)
16	The simplicity of the interface
17	The level of skills needed to perform meaningful analyses
18	The level of flexibility in terms of contract agreements and conditions
19	The ability to handle data in real time
20	Ability to handle multiple sources of data (Excel, Google documents, etc.)
21	Web-data analysis
22	Offline access to data
23	Tablet and mobile integration

Figure 1: Key adoption factors (Agostini and Florèn, 2013, p.29)

THEORETICAL FRAMEWORK

The Kano model suggests that the relationship between the performance of characteristics and customers satisfaction is non-linear, categorizing them as must-be dimensional attractive neutral or reverse (Nilson and Fundi, 2005). In previous times, the relationships between the degree of customer satisfaction and the fulfillment level of CRs were commonly perceived in one-dimensional terms, which the higher the level of fulfillment of customer requirements, the greater customer satisfaction (Tontini et al. 2013). Based on this understanding, Kano's model categorizes different CRs based on how well they can achieve customer satisfaction (Ting and Ping, 2010).

Must-Be Quality: It is the first basic dimension, which refers to as the expected quality, basic quality, and dissatisfied quality, defines the characteristics which are taken for granted by customers, or which are expected to be at a sufficiently good level. Then, it can be presumed that

the customer will be not satisfied. These are the attributes not valued very much by customers considering as low attractiveness. Nonetheless, without their presence, it results in the non-linear increase of customer dissatisfaction. These are the qualities which customers consider so obvious that, as a rule, they will not mention them in the voice of the customer (VOC) surveys.

One-Dimensional Quality: This category refers to as the quality of performance of current demands and the more the better attributes includes those attributes which proportionally increase satisfaction if they are fulfilled and proportionally decrease customer satisfaction if fulfilled. These are the attributes comprehended by customers, and they care about these attributes and mention them in VOC surveys.

Attractive Quality: It can be also called an exciting quality. It consists of features which surprise and delight customers. They offer great satisfaction if they are fulfilled, but do not cause dissatisfaction if not fulfilled, because the customers do not expect the product to have these features. In VOC surveys, this is also an unspoken condition, and customers show up their views only when prompted. Customer satisfaction increases dramatically and nonlinearly when this attribute is fulfilled. These attributes may boost customers to buy the product straight away or to prefer the product when shopping.

Indifferent Quality: This secondary category, also known as neutral, contains attributes whose existence does not create satisfaction, but their absence does not cause dissatisfaction, either. In VOC surveys, customers don't mention themselves even when motivated, as they do not consider them essential. Such attributes are not evaluated either as good or as bad.

Reverse Quality: This category refers to as a reversal attribute, consists such product attributes, the presence of which an increase of the quality results in consumer dissatisfaction. The increment in these quality attributes is reflected in the fall of customer satisfaction. As a rule, this quality attributes needs attention from existence of a group of customers which are in separate market segmentation. They identify any enhancement of certain quality attributes as a burden rather than a benefit. If they feel that the enhancement occurs to the detriment of other important quality attributes, they tend to seek for other products which do not have these attributes (Turisova and Sinay, 2016).

Kano model can identify a set of product attributes satisfying a set of customer needs. By the way, the Kano model is one of the options for compliance customer needs with capacity of producer since Kano model is done to non-linear relationship between customer satisfaction and product performance (Rashid, 2010). Following section is discussed only Kano model oriented review study.

The Customer Satisfaction Index (CSI) proposed by Berger et al. (1993) "is a method to identify attributes classification according to the Kano model based on original research questions. It is based on customer's answers about their feelings related to individual attributes". "Use a Likert scale to measure customer satisfaction and attributes classification according to the Kano model, refining the distinction between the attributes with the same classification". (Tontini et al., 2013, p.1254)

The fulfillment of customers' needs are important to the survival of any company in a competitive market due the fact that satisfied customers tend to repeat consumption and are less sensitive to prices. This fulfillment depends on the performance of services/products attributes. So, the

identification of the relationship between attributes performance and customer satisfaction becomes a key issue to achieve market success (Tontini et al. 2013).

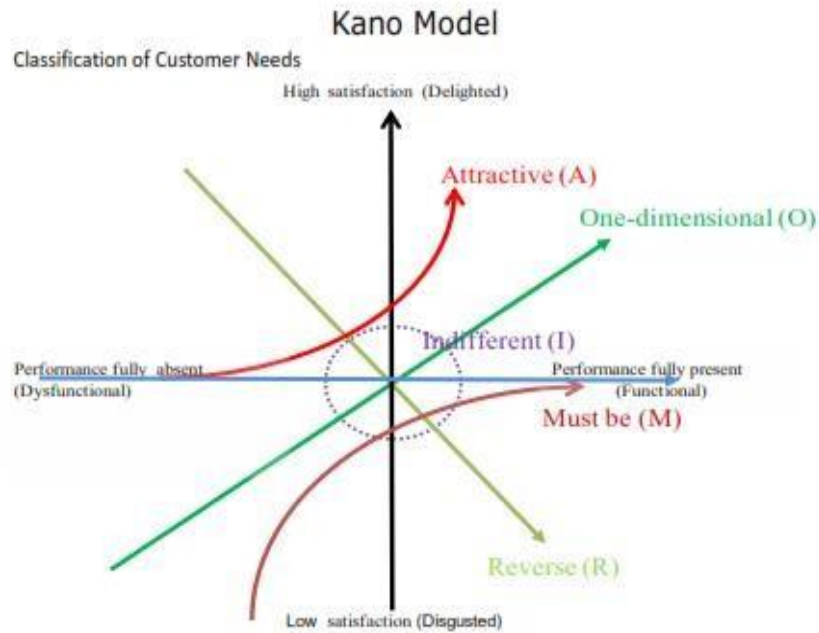


Fig. 1. Kano Model for Customer Satisfaction

Figure 2: The KANO Model (Rashid, 2010)

METHODOLOGY

In this paper, we use secondary data from the previous literature reviews of Kano model, Business Intelligence, SMEs and established a link with each other. As we discussed, the theoretical background, focuses on Business intelligence and the challenges that are faced by SMEs to implement BI systems. This paper will be emphasizing the connection between the BI and SMEs by Kano model. The paper is concluded by reiterating the importance of implementing customer requirements in product development or services.

DISCUSSION

This study offers an innovative model and tool based on Kano Model to prioritize Business Intelligence in SMEs. The need of customer is always important, while using any product. Adapting BI system in SMEs is a complicated task which SMEs needs to invest lots in human capital, methods, and tools to support BI system. One of the well- appreciated models is Kano model for customer needs study for product development. In this case Business intelligence is the product and SME is the customer. Kano's model is based on the motivational research that was originally conducted by Herzberg. Kano model differentiates three important needs to meet the customer satisfaction such as basic needs, performance needs and excitement needs. Customers will feel satisfied if (1) their basic needs are not disappointed (2) the product or service can surpass in comparison to the competition on their performance needs and (3) optionally the

customers obtain additional value that they have not expected on excitement needs (Knop, 2007).

A Kano model can be adapted to the computer using Monte Carlo Simulation in determining the product attribute from virtual customers. This model can be outlined by the rational rules of the computer for SMEs regarding Business intelligence. AS, BI satisfies one of the key factors of product attributes in Kano model i.e. the attractive attributes. A good number of attractive attributes that leads to better satisfaction for many small and large organizations. While this tool can also for applied to large companies, it is initially established and recommended for SMEs which are more facing the challenges such as limited financial resources. In order to assess and prioritize, Kano-based BI tool will be applied. This tool comprises of several items which are common practices in any organization and are extracted from relevant literature. Company owners/managers may edit this list by including some other BI activities which better suits the nature of their business (Nejati, 2012).

As Morsing and Perrini (2009) asserted, although it is very complex to identify, investigate and communicate about the usage of BI in small businesses, it is the use of an area which deserves more consideration because of its potential impact on the global economy. While SMEs are smaller in size, when compared with multinational and expansive organizations, the aggregate effect of independent ventures on society and economy is gigantic and can't be overlooked. In fact, SMEs are overwhelming in their contribution to GDP and innovation and are in charge of a huge employment creation in numerous nations.

While BI is relied upon to meet the requests and expectations of stakeholders, it is a mere adoption practice that is applied to other companies. At the end of the day, a few firms only mimic comparable practices by different organizations, without distinguishing their partners and speaking with them to recognize their demands. In this interval, the proposed approach fills this hole by inspiring organizations to take part in a two-way discussion in correspondence with their stakeholders and participate in BI activities which are the voice of their customers, and not simply the voice of company. In the event that organizations expect to separate themselves from different firms and build up a superior and recognized picture among others organizations, they can go for satisfaction needs of stakeholders. It is important to note that small businesses can follow a flexible strategy for various stakeholders, by deciding which types of needs they want to cover for each specific stakeholder group. Finally, it is worth noticing that the Kano model is a dynamic rather than static one. With time excitement needs turn into performance needs and ultimately possibly into basic needs (Knop, 2007).

CONCLUSION

Kano model is considered as a valuable tool to upgrade the competitiveness of organizations by helping them concentrate on client needs in product improvement. It helps organizations to discover which necessities they should satisfy (threshold), which prerequisites they ought to be competitive (performance) and which prerequisites get a differential in the eyes of the client (excitement). Though it is perceived as a tedious and time-consuming process, it is used in product development project by many major companies to find the pulse of the customers and deliver the products or services as needed.

At present, the increasing impact of business intelligence on SMEs activities has been observed. BI generates a real business value of data asset and provides substantial enhancement in identifying and taking advantage of business opportunities. The well-defined and well-pursued policy of BI use allow SMEs' managers track the business strategy performance and improved

decisions that ensure driving their enterprises to success. The integration of BI systems is important for SMEs from a strategic point of views, especially due to the competition; they face in a globalized business and economic environment, where the focus on cost reduction and customer needs is of utmost importance.

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