Analyzing the Role of Business Intelligence in Using the Information Systems

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1. Introduction

Business intelligence is one of the most important components of information systems which plays an important role in high competitions, data abundance and new technologies. Currently, companies are under hard pressure for answering to the changes and complicated market status quickly, and they need correct tactical, operational and strategic decision making [1].

Business intelligence is one of the most important drivers of this decade [2]. Big information system companies are creating special units which work exclusively in business intelligence and help companies to become more effective and efficient in daily performances. The business intelligence is advancing quickly to become more innovating and gain knowledge of data flow in such a way that is never done before. Nowadays, innovating programs of business intelligence are being executed in all industries [3, 4]. A company which uses the business intelligence system, could be more effective and efficient and spread knowledge within the company with financial partners and improve the decision-making process and lead the company to become more competitive [5]. Measuring the effect of the business intelligence system on gaining the best results and increasing the profit rate of investments is very important.

In the past 40 years, there were several models for measuring the effectiveness of the information systems, such as logical action (1975-1980), planned behaviour (1985), technology acceptance (1986), customer intervention (1984), Delone and Mclean (1992), Sedan (1997), Sueh and Marcus (1995), corrected Delone and Mclean (20013) and others [6].

Among these models, Delone and Mclean (2003/1992) and the opposite model, the Sedan Model 1997 is more important. This study has used the operational theory of Rai et al. to identify and analyze the usage of business intelligence by using two previous models (the name of the used structure is changing with system dependency, and structurally, the individual effect changes with the understanding of practical usage) in the Armin Beton Yazd company.
The other point which must be analyzed is the structure of using the system (system dependency) which hasn't shown good performance in the successful models of the information systems. Some research indicate that to reduce the losses of a successful business besides risk management as an important issue for organizations in a dynamic business environment [7, 8], business intelligence in using the information systems could come in handy. Despite the increasing rate of implementing such systems, there is little information on business intelligence.

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2. Research literature

2.1. Successful models of the Delone and Mclean information systems

Delone and Mclean [9] created a pattern which tried to evaluate the effect of the information system, by considering six structures. After ten years, Delone and Mclean revised this model and assessed some units which had used some or all of their model and stated that this model had provided the main goal: achieving the information system success, via related multi-dimension structures. They corrected the model considering the next designs: information quality, system quality, service quality, system usage, customer satisfaction and pure advantages. The model can be seen in Figure 1.

![Figure 1. Delone and Mclean (2003)](image)

One of the independent structures is the information quality, and its variables are precision, clarity, on-time output, reliability, completeness, connection, importance and repetition. The second independent structure is the system quality which suggests paying attention to variables such as system performance, calculation system reliability, on-time and online response and easy use of terminals. The third independent structure is the service quality which could be evaluated through the technical qualification of the information system employees, their perspective, their ability to develop products and on-time services, and the time needed to create the systems. Some marketing measuring tools such as SEVQUAL were used to measure the tangible, responding, reliable, and unanimous dimensions [10].

In past years, several evaluations of the Delone and Mclean's model have been carried out. These studies have confirmed the partial or general usage of this model and most of the relations between the structures [11].

2.2. The success model of the Sedan information systems

The Sedan model (1997) is trying to improve the Delone and Mclean model from 1992. Based on Sedan, this model is obtained from the combination of the process models with one other variation. This model preserves a big part of the Delone and Mclean model but is divided into two different models and removes the process model. The first side model is the variation of the behaviour model of partially using the information systems. The second side model is the successful model of the information system and mostly is the Sedan and Mclean model. Both models are united, first, from the partial part of the behaviour model of using the information systems through individual, organizational and social
consequences and then from the successful model of the information systems through the partial behaviour of using the information systems, from customer satisfaction structure to expectations about the pure advantages of further use of information systems.

The partial behaviour model of using the information systems includes expectations about the pure advantages of the future structure of using the information systems which is directly connected to the structure (behaviour) of using the information systems.

The successful model of the information systems is made of three bodies. The first body is measuring the information and system quality, with system quality structures and information quality. The second body is the understood public actions of pure advantages of using the information systems with received profits and customer satisfaction. The third body is the other pure advantages of using the information systems with the individual, organization and pure society advantages. The structures of the first and third body affect the structures of the second body.

Furthermore, the understood profit-making of the second body is directly connected to the customer satisfaction structure. Finally, the customer satisfaction structure gives feedback on the partial behaviour model of using the information systems with the expectation of information system usage advantages. The Sedan model can be seen in Figure 2.

Sedan indicates that information systems must be used after effects and advantages because they don’t cause them. The Sedan has confirmed that using behavioural information systems meant the efficient usage of an information system. The Sedan model has named the information systems as the behaviour caused by the successful information systems. Using information systems is the result of their success. Regarding the use of structural information systems, unlike the Delone and Mclean model, this model was developed for arbitrary and non-arbitrary use. However, Delone and Mclean’s model only assumes intentional use [12].

Several recent strides have used the Sedan model because it completely explains the effect of an information system [13, 14].

2.3. The corrected model of Sedan information systems success

Rai et al. [12] used the Delone and Mclean’s model [9] and the Sedan Model (1997) to evaluate both models. It turned out that they both had a suitable ratio. They considered the third option and corrected the Sedan Model. It was estimated that the understood advantage was related to personal effects, considering that Delone and Mclean (1992) described several structures to emotional products.

Therefore, Rai et al. [12] created a pattern made of 5 structures: system quality, information quality, understood profit (individual effect), customer satisfaction and system use. Furthermore, they showed the system application in the system dependency conditions. The Sedan Model was corrected, such as a correlation path between the system usage (system
dependency) and understood profit. Therefore, the best suitable and various description was obtained. This model can be seen in Figure 3.

![Figure 3. Rai and others (2002)](image)  

The more related studies which have analyzed the effect of business information and intelligence and used Delone, Mclean and Sedan models are as followed.

Below, we have the goals and the study types of different authors related to the title of the study:

- Ivari [15]: the successful test of the Mclean and Lcloan information systems in accepting a new information system, study type: quantitative
- Rai et al. [12]: evaluation of the credibility of the information system models, study type: quantitative
- Lee et al. [16]: the effect of data storage on the performance of the retailer companies, study type: quantitative
- Hang et al.: the practical and conceptual impact of data storage in the financial companies in Korea, study type: quantitative, tool: sampling with the questionnaire
- Park: data storage effect as a backup for performance improvement using the decision-making backup system, study type: quantitative, tool: lab experimental
- Wixom and Watson: the success factor of implementing a data storage, study type: quantitative
- Nelson et al.: the requirements of quality in data storage, study type: quantitative, tool: the initial data of related study
- Chin: the success factors of data storage, study type: qualitative and quantitative, device: sampling with a questionnaire
- Brown and Djaiaacoudi [13]: the application of information systems success model in electronic business, B2C, Study type: quantitative, tool: sampling with the questionnaire
- Chen et al. [10]: the discovery study of satisfaction in data storage, study type: discovery quantitative, tool: sampling with the questionnaire

2.4. System use structure (system dependency)

There are several studies regarding the use of the system, customer satisfaction and individual effect which has had controversial discussions. Some authors show that there is a direct relationship between using the system and individual performance [17]; others didn't find any relation between those structures [18].

There is a direct relationship between the system use and customer satisfaction [15, 19, 20]. And other authors show that this relation doesn't exist. Other authors find a direct relationship between the system use and personal effects [21, 22]. Other authors didn't see that relation (Goldman 1998, Roman and Milan 2000) [23, 24].
2.4.1. Volunteer and force fields

Nourzeidi et al. [25] analyzed the effect of user's resistance against using the internet and its connection to the performance of the middle managers in an organization field. They also investigated the reason and effect of the user's use and resistance regarding volunteer or forced use. This study showed that this usage meaningfully explains the variation percentage about the manager's performance. Low resistance shows the cases in which the managers are forced to use Intranet because they don’t have any other options to complete their career. It's seen that using Intranet has a very good effect on managers performance and is one of the effective factors of individual performance.

Eom et al. [26] researched the role of information technology in the electronic learning of system success in a force field, using PLS to analyze the results. They found a meaningful relationship between the use and the personal effect. They compared this study with the researches of Rai et al. [12]. The latter worked in a voluntary field and analyzed the data using the information systems and found significant relations between both structures. Furthermore, they compared the results with Ivari’s researches [15] who worked in a forced filed and analyzed the data using PLS but didn't find any meaningful relationship between two structures.

Hannington et al. [27] studied the use of the electronic medical record system in the forced field. They found out that understanding the relations between the key technology acceptance structures and using them needs a multi-dimensional abstraction of usage structure (the time spent on the system, usage time and instruction). While they agree with Burton-Jones and Straub [28] to exploit certain actions for structure usage field and conditions, they found out that weak measures actually could be useful in some special situations.

As said before, Peter and Mclean [29] did a meta-analysis with more than 50 studies. They used Delone and Mclean’s model to evaluate the explanatory power of the system usage structure. They showed that this structure must be improved to be able to make many connections to other facilities and explain the effect of information system models.

2.4.2. New concepts of system usage structure

Dishow and Strong [30] tried to explain the system usage structure using a medium frame, use intention, and independent facilities related to the work suitable with technology: natural fitness, text fitness, presentation and accessibility appropriateness, and with behaviour control structure. They can explain 16% of the system usage structure variation and 70% of structure use intention.

Burton-Jones and Straub [28] reconceptualized the system usage structure in a special naming condition. The work was done in two phases: definition and selecting. This design allows the researchers to take precise actions of system usage for a special field. The first phase needs to define system usage and determines the main assumptions. In the selection phase, the system must be designed based on its structure and performance.

To explain the system structure usage better (time, abundance and density), Venkatesh et al. [31] used a medium structure, behaviour expectations and two independent structure, behaviour goals and intentions and catalyzing conditions in a longitudinal field study. They explained system usage between 60 and 65% of the dependent structure variation.

Then, to determine the system usage structure, even more, Lallmahomed et al. [16] used a medium frame, behaviour goal, performance expectations of the independent facility, attempt expectations, social effect, catalyzing conditions and unit satisfaction performance and the system was used as a dependent structure (cognitive absorption, volume, frequency and density, and using the deep structure). The explanatory variation was gained from 71% of the conditional structure.

As seen in the previous lines, there are contradicting results of system usage structure’s relation (system dependency structure) with the understood profit of structure (individual effect structure) and other structures as user satisfaction. It's not very obvious that while having a meaningful and direct connection between the system usage structure with additional structure, when the conditions are forced and when they are voluntary. Furthermore, some authors such as Venkatesh et al. [31] and Lallmahomed et al. [16] tried the new conceptualization of this structure and worked with the usage predictors and gained good explanations of system usage structure (between 60 to 65 and 71% explanatory variation).
3. Methodology

This study is of qualitative, applicative, library and field type. The information-gathering tools are observation, interview, articles research and Analysis, organizational documents and books. The data analysis method is the discovery of content analysis.

1. Information analysis

We answer these questions in this part.

2. What is the role of the business intelligence system in using the information systems?

3. How can the business intelligence system be effective in using the information systems?

In recent years, Delone and Mclean's model is one of the more used models in calculating the effect of information systems, and it's evaluated through several studies which have used it partially or totally. Most of the relations between the structures are confirmed [11]. As said before, using the structure system could be a good sign of a successful approach when it's voluntary or forced. But not when the system has users who have to execute, because they don't have a replacement system for information analysis [32]. Furthermore, Peter and Mclean [11] conducted a meta-analysis on the of information systems based on 52 studies cone on the success and Delone and Mclean of information systems. They found out that user structure must be improved. Considering that there isn’t a more compatible or secure action, it will be hard to find the relations between this structure and other models.

Wieder et al. [33] carried out some researches about the effect of business intelligence tools on the performance with Delone and Mclean's model on the success of information systems. They didn't find a significant relationship between customer satisfaction and using business intelligence but found a weak relation between using business intelligence and performance factors. They stated that some properties could be seen in the business intelligence system: first, the most advanced system users use the system with full capacity, find the error and ask hard questions about the system, are less satisfied with the system and use it less. On the other hand, less experienced users look for easy ways of using the system; they find all they need, are satisfied with the system and want to use it more.

Second, business intelligence is created to get reports for ease of use in a completely automatic way. The users who want to use the system fully, must have more advanced technical skills and know a little more about the system basic configuration. User disappointment indicated non-closure and lack of enough technical features in the system. Finally, because of the lack of mind and cultural awareness of business intelligence, there won't be insufficient use of the system, and the business intelligence will have an incomplete performance. Because of these reasons, the system dependency structure (system usage) doesn't work well in Delone and Mclean model based on Rai et al. [12], which means it's neither appropriate nor presents a good level of explanation.

The corrected Sedan Model considers another limitation compared to the Sedan Model. This shows that there is a relation between the understood profit-making (individual effect) and system dependency structure (system usage). Therefore, there will be better appropriateness and explanation. We assume that the system users have only one suitable option to analyze and obtain information, which increases the profit understanding of the understood profit-making
(individual effect). Therefore there is a correlation between the understood profit-making (particular impact) and system dependency (system usage) without a cause and effect relation between them [6].

The system usage structure (system usage) seems to be working properly in this study. However, the explanations are not various by using the successful pattern of Sedan information systems, and it shows no relation to the individual effect (understood profit) (observed while using the successful model of Sedan). The system usage structure could be mediated using a behaviour goal structure which works with the next independent structure: performance expectation, attempt expectation, social penetration, and catalyzing conditions. This usage structure will have the following variables and components: user aspect (cognitive absorption), system aspect (volume, frequency, density), and work aspect (using deep structure).

4. Conclusions

The results show that the Sedan model compared with the Delone and Mclean Model and the corrected Sedan Model, explains and executes what is shaped with the business intelligence system.

As a way of confirming the practical and theoretical consequences, and incepting some of the results, we can say that the Sedan model explains what happened by a business intelligence system and prefers to use this model while investigating. However, repeating this Analysis is important to confirm the results. Regarding the usage structure (system dependency), It seems that it’s essential while using it as a part of the information system syces model, such as Delone and Mclean or Sean's model, which must be stated with more details while considering some of the same components, as stated by Burton-Jones and Straub [28], Venkatesh et al. [31] or Lallmahomed et al. [16].

Conceptualizing the system usage structure considers usage predictors to get a better explanation (more various) and get more important relations with other structures. The other point will be that try to be more strict, make some targeted actions possible, and don’t use only perceptual actions for several structures.

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