THE IMPACT OF RIGHT-TIME BUSINESS INTELLIGENCE ON ORGANIZATIONAL BEHAVIOR

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Abstract

In today's business world, speed of decision making is critical to the achievement of excellence and success that is reflected in the standard range of business objectives in terms of increasing the volume of sales, and to retain and increase market share of the company.

As to make quality business decisions it must be based on quality information and knowledge.

The aim of this paper is to show how well placed Right-Time Business Intelligence systems contribute to a good business decision making at all levels of the company. Such Business Intelligence systems affect organizational behavior for all company employees by creating an organization that continuously learns.

Companies set up in a way that business decisions are made on the basis of the positive effects of a continuous process of learning will consequently bring quality business results.

JEL Classification: G02, H32

Keywords: business intelligence, right time business intelligence, decision support system, organizational behavior

Introduction

In order to achieve the planned business objectives it is essential that companies constantly develop their ability to adapt to changing circumstances and market requirements (De Wit & Meyer, 2004). In accordance with this conclusion it is necessary to introduce a constant learning process that could affect the market (Simons, 2000).

The process of learning should come through attempts and mistakes or through experimentation. How would people and organizations passed through the learning process it is necessary to act and subsequently think. This means that organizational learning and insight is the real action that the company should take (Simons, 2000; De Wit & Meyer, 2004). Consequently, those organizations that are taking the action are hoping to create opportunities and affect the market to achieve their business goals. This raises the question of how to create a learning organization (Senge, 1990).

The learning process not always comes from the absolute change of behavior, but also from the shaping of behaviors; by the consecutive improvement to induce desired behaviors (Cooper et al, 2007; Daniels, 1989). The shaping of behaviors is usually something that is required in the learning of new behaviors (Daniels, 1989).

A behavior, which is defined as any observable and measureable act, can only be changed or improved in either two ways; by affect what comes before the behavior, the antecedent, or affect what comes after, by the behavioral consequence (Daniels, 1989; Wilder et al, 2009).

Figure 1 shows the *Three-term contingency model* (Skinner, 1957) in which this principle is explained. It explains how the consequences affect future behaviors and consequently if the behavior is changed learning has been created (Daniels, 1989).

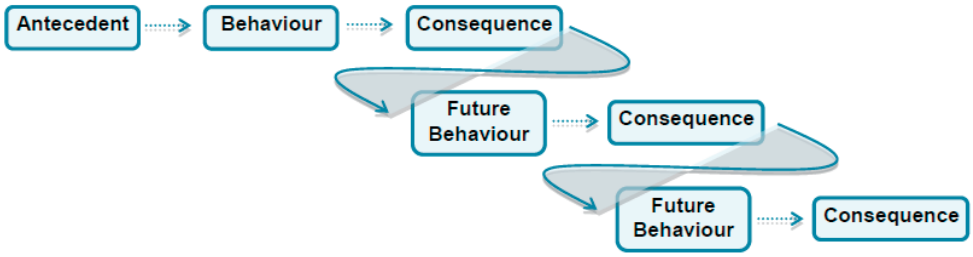

Figure 1. The three-term contingency model

Business Intelligence

The term business intelligence is first used in an article by IBM researcher. He defined intelligence as: *the ability to apprehend the interrelationships of presented facts in such a way as to guide action towards a desired goal* (Luhn, 1958).

Business intelligence evolved from the decision support systems which began in the sixties and developed throughout the mid-eighties. Decision support systems originated in the computer-aided models created to assist with decision making and planning. In 1989 it is clarified that *business intelligence* is an umbrella term to describe *concepts and methods to improve business decision making by using fact-based support systems*. Business Intelligence is sometimes used alternately with briefing books, report and query tools and executive information systems. In general, business intelligence systems are data driven decision support systems (Power, 2007).

In today's business world full of struggle for markets and market competition is immensely important to making sound business decisions based on relevant and quality data. Proper implementation of business intelligence tools puts the company in a position where it is possible to make good business decisions and be confident that these decisions are based on good data. These decisions are consequently easy to be trusted. Business intelligence can also provide information about the details of the company, products, services and customers. For users who have such a tool in the hands through which they can quickly and easily access information to the base of them have taken appropriate action or made a business decision business success is achieved.

Impact of business intelligence technologies

Business intelligence covers a wide range of applications and practices for the collection, integration, analysis, and presentation of business information, with the most important objective to support organizational learning and better business decision making. Most organizations have in placed knowledge management systems to integrate internal information with information acquired from external sources. With the technology progress in groupware and social media organizations can now very fast and more efficiently engage in knowledge sharing and organizational learning. Relevant and timely business information is recognized as being essential for organizations not only to achieve business goals but even to survive in today's rapidly changing business environment (Lönnqvist & Pirttimäki, 2006).

Competitive advantages have shifted from those with expertise in how to implement new technologies, through those who know how to use technology to improve business processes, to those who know how to use technology to share, manage and increase the level of knowledge (Pisello & Strassmann, 2003).

Constant need for fresh information resulted in changes in corporate decision-making at all levels within the organization. In order to preserve the competitiveness of their companies managers should not and cannot rely solely on intuition when making decisions. Business decisions must necessarily be supported by high-quality and timely information about events within the company as well as information from the environment of the company. Companies need trusted information systems that provide managers and business analysts as well as officials of all levels adequate access to quality information necessary to make timely and effective business decisions. (Puklavec, 2001).

Regardless of the type and format of data processed by the information system and the way it works, the main goal is to achieve a sufficiently high quality, reliable and accurate information delivered at the right time. The greater the difference between the results of the effect of good and bad business decisions, the greater is the importance of access to high-quality and reliable information (Thomsen, 1997).

There are about 30 conceptual frameworks of information quality that define and categorize quality criteria for information in various application contexts (Burn & Knight, 2005; Eppler, 2006).

In order to ensure quality and adequate evaluation, information may wriggle through the conceptual frameworks that provide useful benchmarks and standards for information systems auditing (Merhout & Havelka, 2008).

To make a business decision was necessary to ensure a quality lightweight information base in terms of converting enormous amounts of structured and unstructured data into quality information. It is the ability to convert the masses of data in real time or as soon as possible, allowing companies to achieve an enviable competitive advantage. In this way, companies that establish business intelligence systems, enables the achievement of excellence in relation to customers and clients (Hall, 2004).

Benefits of using Business Intelligence systems

Using business intelligence system provides its users with increased understanding of complex information, which puts them in the position of making faster and better business decisions and thereby effectively achieving business goals. Key benefits of business intelligence systems are reflected in the creation of a basis for increasing the effectiveness and efficiency of the company. Using business intel-

ligence systems based on the aggressive and timely approach leads to reengineering of existing business processes and their changes and optimization, which consequently leads to new business opportunities and opportunities. (Lokken, 2001).

Business analysts and other users of business intelligence stress that firms such systems provide benefits and advantages that it is sometimes difficult to define in a precise way. Due to the large scope of application of business intelligence in both internal as well as external environments, companies can achieve significant and numerous advantages. Advantages of business intelligence can be defined as follows (Thompson 2006):

- **Measurement** - program that creates a hierarchy of performance metrics and benchmarking that informs business leaders about progress towards business goals.
- **Analytics** - program that builds quantitative processes for a business to arrive at optimal decisions and to perform learning and Business Knowledge Discovery.
- **Reporting/Enterprise Reporting** - program that builds infrastructure for Strategic Reporting to serve the Strategic management of a business, NOT Operational Reporting.
- **Collaboration/Collaboration platform** - program that gets different areas both inside and outside the business to work together.
- **Knowledge Management** - program to make the company data driven through strategies and practices to identify, create, represent, distribute, and enable adoption of insights and experiences that are true business knowledge.

Business intelligence systems are excellent for the modern business as it has the capacity to ensure smooth, incessant flow of information without negotiating on security. The duty of the system is to ensure that correct decision is taken with the available data at the appropriate time. It greatly reduces the distribution costs spent on the information as well as handling time. Today's global competition adds a complex component to markets with increased consolidation and competition in trade, new growth opportunities and sales channels, and critical necessity for efficient supply chain and cost optimization. To compete in this environment, organizations must establish and leverage a powerful combination of technology,

business intelligence and results management and deliver quality and value with every shipment and for every customer.

The movement to right-time is the latest development in Business Intelligence and Data Warehousing. Right-Time Data Warehousing provides the data that is required to implement right-time Business Intelligence. By moving to right-time, firms can use Business Intelligence to affect current decision making and business processes. This capability is especially important for customer-facing applications, such as those found in call centers and check-in processes, and helps firms become more customer-centric. To be successful with right-time Business Intelligence, organizations must overcome both organizational and technical challenges. On the organizational side, there must be executive sponsorship and support, initial and on-going financial support, governance processes put in place, Business Intelligence and Data Warehousing personnel with the requisite skills, changes in business processes and acceptance of use of right-time data by organizational personnel. On the technical side, new hardware and software must be acquired and implemented, processes and procedures for supporting and managing right-time data feeds from source systems must be established, data must be quickly transformed and loaded into the Data Warehouse, and the data must be analyzed and made available to operational systems and personnel.

The Latency and Value of Data

The value of the data in most cases decreases with time. Low latency data has generally greater value than the high latency data. This is the prime reason why it is attractive to Right-Time Business Intelligence. Useful perspective is provided on latency as applied to Data Warehousing (Hackathorn, 2004).

As seen on Figure 2 there are kinds of latency.

- **Data latency** is the length of time between when an event occurs and when the associated data is stored in the Data Warehouse.
- **Analysis latency** is the time between when the data is stored and when it is analyzed and made available to applications and users.
- **Decision latency** is the time from when the information is available until some action is taken on it. These three sources of latency are additive and result in total latency.

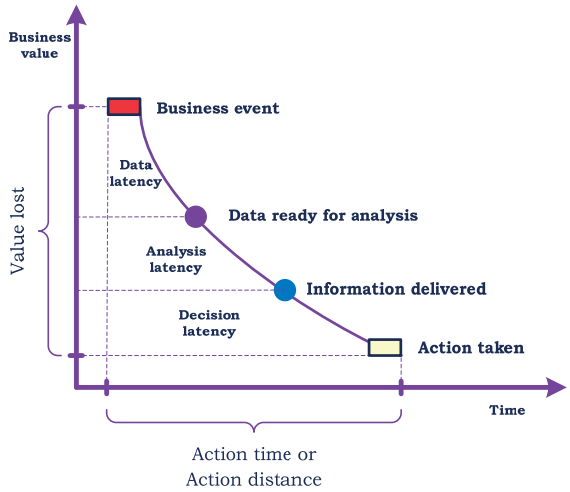

Figure 2. Types of latency (Hackathorn, 2004)

Reducing data and analysis latency primarily depends on technical solutions. Recent technologies especially in real-time Data Warehousing provide help in this regard. But, the main thing dealing with decreasing decision latency requires changes in business processes as well as how people use provided information in doing their jobs. Providing real time data does not automatically create business value and quality business decisions unless it is used in a timely manner. Dealing with decision latency is usually more challenging than data and analysis latency.

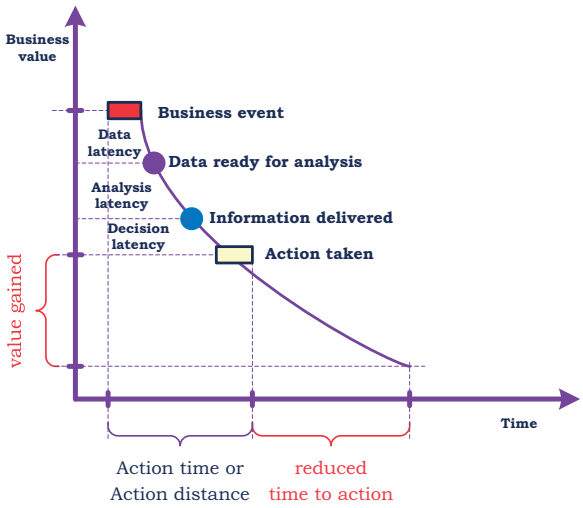

Figure 3. The Benefit of Reducing Latency (Davis, 2005)

On Figure 3 there is a maturity model for Business Intelligence (Eckerson, 2007). The model is based on the concept of latency. The red line in the model stands for the freshness of the data (indicate how new the data is). The blue line in the model stands for the latency of the decision process.

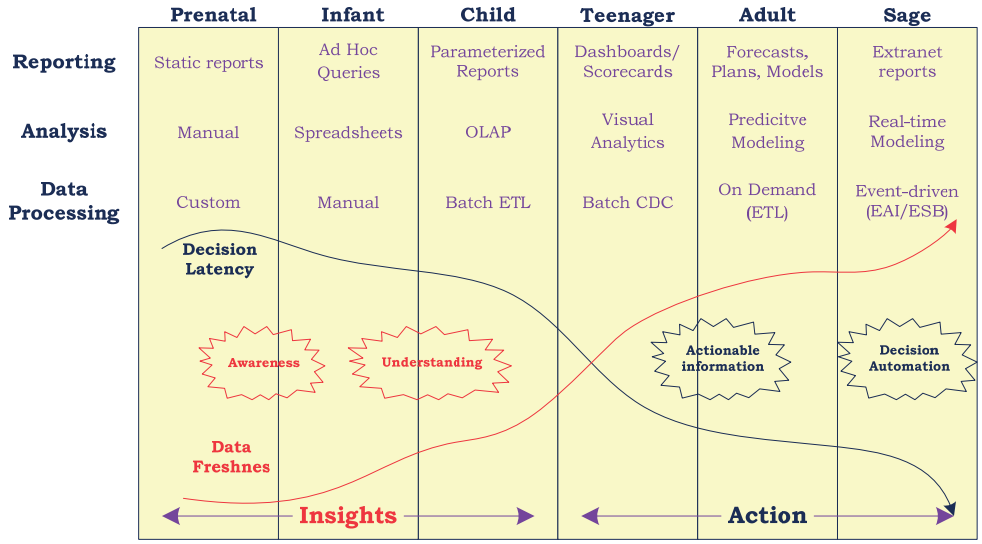

Figure 4. Maturity model for Business Intelligence (Eckerson, 2007)

In the model, traditional business intelligence corresponds to the *prenatal* and *child* phases. These are phases characterized by high latency in the decision making process and low data freshness. Phase's *teenager* and *sage* correspond to operational business intelligence. These phases are characterized by low latency in the decision making process and high freshness of data. We can say that a business intelligence system becomes more operational with the age. In conclusion we can identify 4 types of business intelligence.

Table below reviews the differences in the various types of Business Intelligence.

Table 1. Business Intelligence types

Characteristics	Business Intelligence type		
	Strategic	Tactical	Operational/Right-Time
Business objectives	Long term (strategic)	Tactical	Manage and optimize daily business operations
User type	Top/senior manager, financial analyst	Top/senior manager, financial analyst, operational managers	Top/senior manager, financial analyst, operational managers, operational users (call center, sales agent)
User population	Tens	Tens-hundreds	Tens-thousands
Time framework for analysis	Months-years	Days-months	1 day/seconds
Data type	Historic	Historic	Historic, current (zero latency)
Query response time	Hours-minutes	Hours-seconds	Minutes-seconds
Instruments for data access	Excel, Business Intelligence specific tools	Excel, Business Intelligence specific tools	Portals, Dashboards, Scorecards, Alerts
Data disponibility	Non critical: Tolerant to non-disponibility	Non critical: Tolerant to non-disponibility	Critical: Cannot tolerate non-disponibility
Latency	High	High-medium	Low
Data freshness	Old	Old-new	New

Make faster and quality business decisions

Good and quality business decision is one that assures strategic and business goals. It is also right time decision. Bringing faster decision could be a great advantage for the company future. Less time is spent to problem detecting leads to less time spent on reacting to it thus makes bigger probability company answers on time and not late on the market condition.

In that sense information has value only if it is bring to management on right time. Because of inappropriate and late information management often make decisions based on intuition and experience which are of static character. In contrary information are always new and dynamic in character.

Most of industries today are competitive where business opportunities are very time sensitive. Management capable to recognize business opportunities but makes

slow decisions risks losing market game from competition. When considering faster decision making it assumes information transparency inside the company. If the company disables timely information flow in horizontal and vertical way it risks management makes decisions based on obsolete thus inequality information. Consequences of decisions based on obsolete information could be extremely critical for companies for example loosing most important client or continuing to produce product not attractive to market, falling stock prices.

According to an author, 80 percent of the time dedicated to decision making is actually spent gathering information, leaving only 20 percent for actual analysis. Linking relevant numeric and textual data can improve this ratio (Liautaud, 2006).

Dynamic and rapidly evolving technology lead to a fact that physical strengths are being replaced by intangible assets such as intellectual property, knowledge, intelligence, brands, R&D teams, and market position, resulting in volume-based advantages being less prominent (Fleisher, 2007).

There is often a large gap between the information required for management decision-making and a myriad of data collected daily in the company. Estimates are shown in the following figure shows the gap in knowledge and decision-making in relation to the available data, and analysis capabilities of the company (Patajac, 2003).

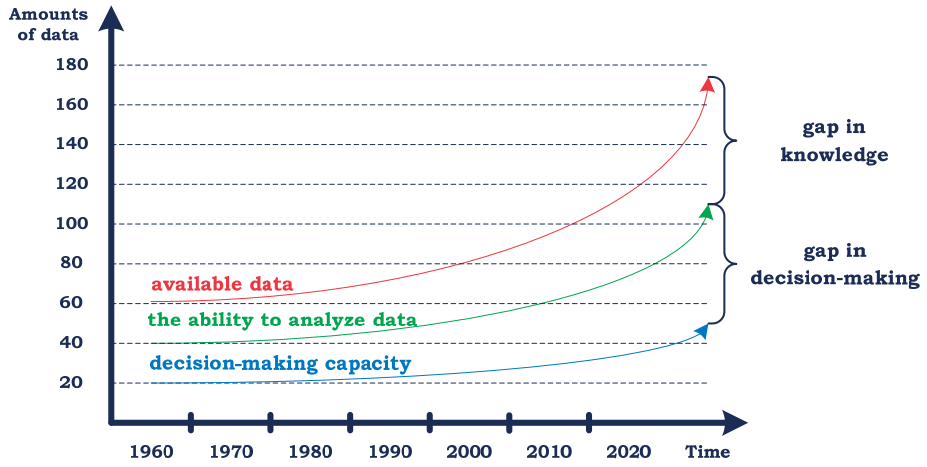

Figure 5. Gap in knowledge and decision-making (Patajac, 2003)

In order to bridge the gap companies should invest in the development of business intelligence to assure raw data transformation into useful knowledge, and thus

sustain competitive advantage. Data are systematized or unified and disorganized, and only then become information when they are relevant for a certain decision problem, i.e., the information can be interpreted as fact when there is data that is argued. Information is converted into knowledge when they successfully used to make business decisions. Business intelligence enables all levels of management necessary information in their scope of responsibility, however, for the success of the implementation of this concept is essentially the circulation of information and knowledge from them within the company to management could deal with the causes rather than the consequences.

Table 2. Impact on employee productivity (Poslovni tjednik, 2003)

Time employees of the company are used in a single day for:		
	Without Business Intelligence	With Business Intelligence
Gathering data	35%	10%
Data analysis	35%	15%
Decision selection	15%	35%
Planning	10%	20%
Action according to plan	5%	20%

Application of this concept allows the company greater efficiency and improved employee productivity, the study shows the Gartner Group in 2002, and is shown in Table 2.

Today's companies characteristics is the existence of a large gap between the existing data and information required. In order to reduce this ratio it is necessary to define the process of the collection and processing of information. Typically, the company analyzes only 10% of the data they collect, while business intelligence allows to analyze 90% (Patajac, 2003).

Use of Business Intelligence to create learning organizations

To make an impact on the market and to achieve business goals it is critical to develop organizational capabilities to absorb knowledge and create organizational learning. Organizational learning comes from the process of changing human behaviors which leads to organizational behavior change. Learning need to come from taking actions and learning will come from the consequences of these actions. It is therefore important how and when information, in the form of consequences,

is delivered. In today's competitive economy companies currently make use of Business Intelligence to deliver the right information at the right time and thereby facilitate analysis of the organization's operations.

Business Intelligence has traditionally been used for planning and controlling productivity and efficiency, but today's Business Intelligence role is rather for strategic purposes – to improve results and operational purposes – to decision support. To achieve business results and make an impact on the market learning needs to be created. For this reason there should be an opportunity to maximize the use of the information in the Business Intelligence and create learning process from the analyzed information.

Positive reinforcement is the major way in which learning is created and for it to be effective it is essential to consider how it is delivered. Thus, the information in the Business Intelligence needs to meet the same demand as positive reinforces if it should be able to participate to the learning process. Consequently, if the information is in compliance with being immediate, specific, personal, certain, sincere and frequent it should enable organizations to change behaviors and take actions (Daniels, 1989; Braksick, 2007; Johnson et al, 2008; Olofsson, 2010). Data about the actions will then be implemented into the Business Intelligence to be the basis for new learning.

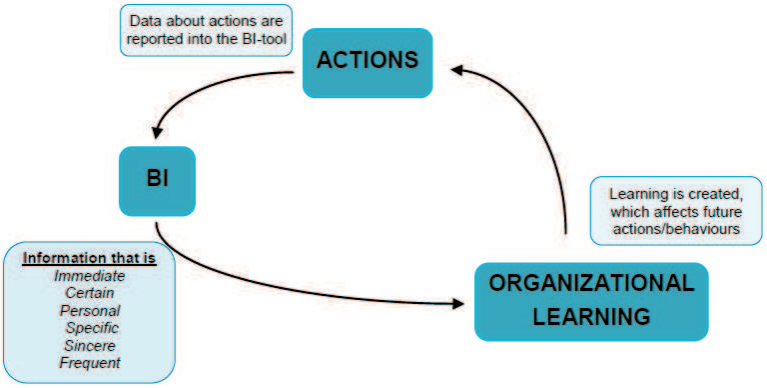

Figure 6. How learning could be created in a Business Intelligence tool

Conclusion

In today's economy companies are under enormous pressure to achieve business goals and to survive on the competitive markets. Therefore it is critical to make quality decisions based on reliable, fresh and precise data in right time.

Also, relationships with customers who today are using all possible communication models, ranging from smartphones, social media and other forms, asking the organization quick and timely answers based on sound business decisions. Business decisions must be taken on the basis of timely and reliable information.

To make this process a constant within the organization must establish a continuous learning process based on knowledge.

As shown in the paper, the decision-making process and the learning process, necessarily leads to changes in behavior which consequently leads to a change in the behavior of the entire organization. Lowering the level of decision making, in virtually all levels of organization, automatically switches responsibility but at the same time provide raising the level of knowledge of each individual involved in the process. Making decisions based on intuition is hard to avoid the higher levels of decision-making but at lower levels of the company can be almost completely annulled. Automated right-time decisioning is the next frontier. Its influence in the business world has the potential to be as significant as other major automation efforts have been in some earlier cases (Panian, 2007).

Lower-level employees who are trained in the use of these tools can in a relatively short period of time to realize their own, as well as the goals of the company. Such tools in a simple way, in right-time, can provide information not only about the relationship with customers and suppliers but also the internal values of each individual involved in the process. In this way, the hierarchy can be evaluated almost all of the company's employees.

Using the tools of predictive analytics as well as statistical and mathematical methods in the framework of business intelligence systems, these systems are slowly but surely entering the field of artificial intelligence, and as such are becoming powerful tools for achieving success in the battle for the customer and the market.

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