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The Relationship between Business Intelligence and Business Success

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Executive Summary

As businesses throughout the world face unprecedented challenges to remain competitive, the importance of Marketing and Business Intelligence (BI) to their survival should not be underestimated. Today, BI plays a key role in business success. The main objective of this study is to evaluate the extent to which there is a relationship between the level of business intelligence activity and the perception of business success. An exploratory methodology was chosen for the study and a conceptual model of BI developed to measure its influence in organizations. A broad sample of Brazilian enterprises and foreign enterprise subsidiaries were selected from a pool of the largest enterprises of the State of Pernambuco, Brazil. Data was collected through personal interviews and analyzed using qualitative and quantitative approaches. The findings suggest that Business Intelligence practices are significantly and positively related to perceived business success.

Keywords

business intelligence, competitive intelligence, and perceived business success.

About The Author

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Introduction

The ongoing quest for formulas of business success is one that frustrates managers and scholars alike. Theories continue to be developed, but are soon rejected as new information comes to light. An example of this is the widely read book, "In search of

excellence” by Peters and Waterman (1982), which classified a group of companies as being excellent, and even models for industry. Subsequent studies confirmed that shortly after the publication of the book, many of these same companies faced significant difficulties. Similarly, writers from McKinsey and Co., a prestigious consulting company, highly praised Enron, in three books just prior to its collapse (Byron et al, 2002). If there is any lesson to learn from these examples it is that there is no unique formula for success.

Success today does not guarantee success tomorrow. Indeed, as D’Aveni (1995) suggests, it is more probable that failure follows success than success following another success.

This probability of failure may be related to an increase, in recent years, of environmental turbulence and an increase in competition or hyper competition. This increase in turbulence, competition and uncertainty was is a key ingredient for the appearance of business intelligence. Similar to military intelligence, business intelligence focuses mainly on the environment. While business intelligence is a recent phenomenon, in existence less than thirty years, military, political and government intelligence have been around for a long time. The works of Clausewitz in the XIX century, Machiavelli in the XVI century, or even Sun Tzu in the IV century (Machiavelli, 1680; Sun Tzu, 2001; Clausewitz, 2002) all address the topic and practice of intelligence.

The environment produces forces of great impact that can define an organization’s success or failure. History offers many examples. The Law of Social Welfare in 1935 and the Law of Work Hours in 1937 created a big market for tabulator machines and IBM’s time clock; thus helping IBM avoid imminent bankruptcy (Drucker, 1989). Investigations of ALCOA and ATandT, forced their break up in 1945 and 1984 respectively (D’Aveni, 1995). The construction of the national railroad network in the 1850s led to the development of the large goods production market in

the United States and the rise of big industrial companies (Chandler, 1959).

It is therefore interesting to ask what leads an organization down the road to success and which factors contribute to this success. With this in mind, the objective of this paper is to explore the relationship of business intelligence to business success.

Literature review

The Society of Competitive Intelligence Professionals (SCIP) is the principal forum for intelligence professionals. SCIP defines intelligence as a process of ethically collecting, analyzing and disseminating precise pertinent, specific, opportunistic, predictable and actionable information about the business environment, competitors and the organization itself (SCIP, 2003).

This definition explicitly highlights intelligence as a process and as a product (Prescott and Miller, 2001; Shaker and Gembicki, 1998; Vedder et al., 1999). In fact, this definition treats information as a product of intelligence specifically because it is precise, pertinent, opportunistic, predictable and actionable. Information is thus an element of the process and at the same time, its final product. One problem with this definition is that there are elements beyond information, such as interpretation, “insight”, intuition and even knowledge that make the final product of intelligence something more than simple information.

As a result, intelligence must not be confused with information (Barclay and Kaye, 2000; Kahaner, 1997; McGonagle and Vella, 1996). The essence of intelligence begins with environmental scanning activities, also known as surveillance. The essence of this process is a transformation of data, information and knowledge into intelligence as a final product.

Unfortunately differences of opinions among intelligence professionals and business managers may be hindering the development of business intelligence. Academics and intelligence professionals appear more concerned about process and technical aspects while business managers are more interested in the results of intelligence activities, and their

impact on business (Prescott and Miller, 2001; Herring, 1999).

Scholars and writers have long argued that intelligence activities are highly associated with results. Some of the arguments supporting this point suggest that intelligence is a condition for survival (Vezmar, 1996); vital for strategy (Pepper, 1999; Gieskes, 2000; Hovis, 2000; Marceau and Sawka, 1999; Tessun, 1997); fundamental for proactive behavior and competitive advantage (Miller, 2000); an absolute imperative for business (Kahaner, 1997); an administrative priority (Marceau and Swaka, 1999); important for profitable and sustained growth (Prescott and Miller, 2001); and fundamental for the success of business (Herring, 1999, Flynn, 1996; Shaker and Gembicki, 1999; Lackman et al., 2000bh; Hart et al., 1999).

It is possible that this acceptance of intelligence activities is associated with positive results. Shell Oil conducted a study of thirty businesses that had survived for more than seventy-five years. Its findings suggest that the capacity to absorb and understand the environment more rapidly than competitors was critical for survival (Dickson and Kalapurakal, 1991). This acceptance of intelligence activities is also related to increased environmental turbulence. Low levels of turbulence do not require high levels of intelligence activities. However, environments with higher levels of turbulence necessitate an increased ability to undertake intelligence activities or manage weak signals (Ansoff and McDonnell, 1993).

This fluctuation in turbulence gives rise to an important pursuit - organizational equilibrium as measured by the difference between external and internal velocity changes. To maintain equilibrium, internal velocity should be increased and follow modifications to the environment. In this regard, role of business intelligence is to change managerial focus from a reactive stance to a proactive one.

In addition, business intelligence supports administrative activities in a much different way than traditional mechanisms. The traditional forms of business analysis work within a historical evolutionary per-

spective, while the real evolution of business doesn't always follow the historical rhythm (Marceau and Swaka, 1999; Tessun, 1997).

The existence of a relationship between intelligence activities and success is also supported by several other studies: Flynn (1996) affirms that it contributes to an increase in business invoicing; Miller (2000) argues that it correlates positively with the number of patents assigned to a company; Jaworski and Wee (1993) believe that it contributes to an increase in product quality and the quality of strategic planning.

On the other hand despite these apparent benefits, the practice of business intelligence may not be meeting expectations. Corporate managers are still not completely satisfied with their intelligence systems (Prescott and Miller, 2001; Lackman et al., 2000; Harkleroad, 1998; Miller, 2000), even if the problem is sometimes related to conjectural conditions, to intelligence professionals, to users or to business itself (Miller, 2000; Betts, 1989; McGonagle and Vella, 1999; Breeding, 2000; Marceau and Swaka 1999).

Yet, insight from the management literature suggests a positive correlation between business intelligence and business development. The specific contribution varies according to objectives derived by business managers, academics, and intelligence professionals. Each contribution can take a different form and can benefit one or more hierarchical levels. It can also affect different business areas, act beyond the sphere of the task environment or micro environment, and involve the macro environment as well.

Therefore, the underlying quest of this study is to explore the relationship between business intelligence and business success. This leads to the first hypothesis:

- **H1 - Business intelligence is positively correlated to business success.**

Business intelligence results from efforts to capture, analyze, and interpret information relevant to the many functions of a business operation. Oliveira

and Cavalcanti (2002) captured this idea by suggesting that behaviors which signal the practice of BI include monitoring the business environment, avoiding surprises, proactively seeking out opportunities and, above all, improving one's competitive advantages. From this perspective BI is considered to cover a wider spectrum than competitive intelligence. While CI focuses mainly on the micro environment BI includes both the micro and macro environment. In short, there are different levels of BI activity that need to be taken into account if we are to understand the relationship between organizational success and intelligence gathering. In particular, they suggest that an effective business intelligence program will pursue insight from the broader macro environment, competitors, suppliers, distributors, consumers and traditional internal functional areas of activity.

This leads to a series of secondary hypotheses. Thus,

- **H2a: Environmental Intelligence is positively correlated with business success;**
- **H2b: Market Intelligence is positively correlated with business success;**
- **H2c: Consumer Intelligence is positively correlated with business success;**
- **H2d: External Intelligence is positively correlated with business success;**
- **H2e: Organizational Intelligence is positively correlated with business success.**

Methodology

This study was conducted in 34 enterprises in the state of Pernambuco, Brazil. This sample contained almost 74% of the universe of the largest enterprises of this Brazilian state. Table 1 suggests that more than 2/3 of the companies were industrial enterprises. These enterprises were chosen due to a higher probability of involvement in the phenomenon being studied (Analoui and Karami, 2002).

The Cavalcanti and Oliveira model (Cavalcanti, 2002; Oliveira and Cavalcanti, 2002) formed the basis of the study. This model offers elements to measure

the level of business intelligence activities and contains the following variables:

- **Environmental Intelligence (EI) refers to the economic, technological, social, political, legal and natural environments;**
- **Market Intelligence (MI) refers to direct competitors, indirect competitors, suppliers and partners, distributors, products, market structure, and market conjecture;**
- **Consumer Intelligence (CI) refers to present day transaction clients, real consumers, potential clients, demographics, psychographics, interchange of information and knowledge, and rising tendencies of the targeted public;**
- **External Intelligence (XI) refers to EI, MI and CI grouped together;**
- **Organizational Intelligence (OI) refers to the marketing and sales, production, research and development, finance, human resources, and general administration functions;**
- **Business Intelligence (BI) refers to EI, MI, CI, and OI grouped together.**

For each of the variables an ordinal Likert scale of seven points was used, varying from 1 – no level of intelligence to 7 – high level of intelligence. Using a quantitative approach, the research also used qualitative methods to evaluate the relationship between the levels of business intelligence and the perceived success of the business.

The unit of analysis was the organization, represented by the perceptions of top managers. The collected data was analyzed by quantitative and qualitative means. Each hypothesis was tested using at least two statistical procedures. These included Pearson and Kendall and Spearman correlation analysis, and multiple regression analysis. In addition, descriptive statistics complement these analytical exercises.

In terms of test results, a 0.05 level was considered significant. Correlation tests were used gauge the strength of the relationships. The data was interpreted using the following scale measurements: 0 to 0.2 very

weak; 0.21 to 0.4 weak; 0.41 to 0.6 moderate; 0.61 to 0.8 strong and 0.81 to 1 very strong.

Principal results

In general terms, Hypothesis 1, which suggested that business intelligence is positively correlated to business success, was supported by the data. The strength of the relationship, found in Table 2, fluctuated from moderation to one of significance with a P-value of < 0.0005 .

Other business intelligence variables also had similar results. Indeed, Hypotheses 2b through 2e were strongly supported. The relationship between business success and market ($r=0.556$, $\tau\text{-}b=0.415$ and $\rho=0.584$ ($p<0.0015$)); consumer ($r=0.417$, $\tau\text{-}b=0.283$ and $\rho=0.402$ ($p<0.018$)); external intelligence ($r=0.585$, $\tau\text{-}b=0.433$ and $\rho=0.589$ ($p < 0.0005$)); and organizational ($r=0.831$, $\tau\text{-}b=0.653$ and $\rho=0.814$ ($p<0.0005$)); were all positive and significant. Hypothesis 2A was also supported. However, in this instance, the relationship between environmental intelligence and business success was weak but positive ($r= 0.396$ ($p=0.02$)). In this case a Pearson test suggested only a partial relationship.

The relative importance of each of the business intelligence variables can be explained through a multiple regression analysis. The results (found in Table 3) suggest organizational intelligence explains 69% of the variance in organizational success with the other variables offering only a minimal effect. Despite these findings, the following factors should be taken into account.

First, organizational intelligence (OI) is a relatively easy function to manage given its internal focus and control by the company. On the other hand, other forms of intelligence (CI, MI, EI) are less malleable due to their external focus. The objects of interests are sometimes hard to monitor and cannot be directly controlled by organizational decision makers.

Second, in less turbulent environments, organizations often resemble closed systems. In these cases Ansoff and McDonnell (1993) suggest that senior managers focus their efforts on obtaining and using

internally generated intelligence. This focus also allows managers to develop and maintain efficiently run organizations.

Third, the customer, a crucial element for any company, is an external factor. Some writers suggest that understanding customer needs and satisfying them is the only path to survival and success (Kotler, 2001; Etzel et al., 2001; Hooley et al., 2001; Churchill Jr and Peter, 2000; Lovelock and Wright, 2001). Consumer opinion can offer insight into the benefits of a product or a service as well as consumption tendencies. It can also help identify wishes, dreams and future fantasies (Kotler, 2001; Lovelock and Wright, 2001). D'Aveni (1995) and Hamel and Prahalad (1995) also argue that managers need to have consumer, market and environmental intelligence in order to predict the future and remain competitive on a day to day basis. Unfortunately, organizational intelligence offers only partial insight into customer needs. Thus despite these findings, organizational intelligence cannot be considered more important than the other intelligence related variables.

Fourth, a classic principle of strategy (Sun Tzu, 2001; Machiavelli, 1680), states that knowing your opponents, their objectives, their actions and their reactions are essential elements of success. In addition, it is also important to know yourself well. Opponents are part of the external environment, the domain of market intelligence.

Fifth, the data or information and knowledge about customers, usually involves organizational and customer intelligence. The context of organizational intelligence is the past and the present making future projections possible but always from an evolutionary perspective and without consideration of present day changes. Consumer intelligence captures possible future changes that are not merely projections of the past. Authors such as Ansoff and McDonnell (1993), Hamel and Prahalad (1995), and D'Aveni (1995) and Albrecht (2000) argue that having a pro active vision

of the business environment is the key for the success and survival of organizations;

Sixth, taking into consideration all the different elements, managers may consider organizational intelligence (OI) as the most important contributor to success, not because it is more important, but only because it is more structured. This possible interpretation is supported by comments from one of the managers who participated in the study. "Although nowadays we are more concerned about market information, the truth is that we have always given more attention to the structure of our internal information system, as well as other aspects of internal nature. Only recent factors like intensification of competition and globalization have made us change our focus".

This last remark supports ideas expressed by Ansoff and McDonnell (1993) who suggest that companies in low turbulent environments should focus on the internal environment. We argue that one should think of intelligence as a natural path to speed up reaction time in turbulent environments. One interviewed executive supported these thoughts: "Our system of capturing market information is a key element for the speed with which we need to move". This in turn is an important reason why academics and executives favor the use of intelligence activities for pursuing business success.

When managers think of the essential elements of business success, they often think of customers and competition. Unfortunately, organizational intelligence (OI) does not include these elements. Consumer intelligence presented the lowest value, holding 4,0. While market intelligence, environmental intelligence and organizational intelligence held 4,9. Business intelligence held 4,7. In addition, consumer intelligence obtained the biggest deviation pattern, 1,21, relatively superior to all that held between 0.65 and 0.89, see Table 4.

The results suggest that managers are apparently dissatisfied with their business intelligence systems, especially consumer intelligence (CI). The findings concur with those of another study. The Futures

Group, tried to measure the efficiency of the activities of business intelligence with senior executives in two field studies performed in different years. Considering a similar scale to the one used in this research, the values found in the two studies were 4,1 and 4,5 (Harkleroad, 1998). The dissatisfaction of managers with consumer intelligence activities within their firms is similar to the findings of this study.

Conclusion

The findings of this study suggest a positive relationship between the practice of business intelligence and business success in large Brazilian enterprises. Organizational intelligence contributes directly to business success. A reason for this may be because it is the most structured form of intelligence.

New management paradigms imposed by environmental changes may be the best explanation for the relationship encountered above. As Ansoff and McDonnell (1993), and D'Aveni (1995), suggest organizations seek mechanisms useful for pursuing a close equilibrium with the environment. Prescott and Miller (2001), and McGonagle and Vella (1996) argue that business intelligence is a means to satisfy this need.

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Appendix

Table 1: Frequency of the participating enterprises by sector

Type of business	Universe		Sample T		% U
	Freq.	%	Freq.	%	
Industry	23	50	14	41	61
Base industry	9	20	9	26	100
Services	7	15	7	21	100
Civil construction	5	11	3	9	
Commerce	2	4	1	3	50
Total	46	100	34	100	74

Observation: % U = Percentage over the universe.

Source of delimitation of the universe: Federation of the Industries of the State of Pernambuco FIEPE; and "Better and Bigger" of the Exame Journal / July 2001

Tabela 2: Relationship between business intelligence and business success

Intelligence	N	Pearson		Kendall		Spearman		Relationship
		r	p	tau-b	p	rho	p	
BI	34	0.695	0.000	0.517	0.000	0.692	0.000	Yes ($p < 0.0005$)
EI	34	0.396	0.020	0.164	0.197	0.270	0.123	Yes ¹ ($p = 0.02$)
MI	34	0.556	0.001	0.415	0.001	0.584	0.000	Yes ($p < 0.0015$)
CI	34	0.417	0.014	0.283	0.022	0.402	0.018	Yes ($p < 0.0225$)
XI	34	0.585	0.000	0.433	0.000	0.589	0.000	Yes ($p < 0.0005$)
OI	34	0.831	0.000	0.653	0.000	0.814	0.000	Yes ($p < 0.0005$)

¹ Only in Pearson test.

Table 3: Analysis of multiple regression between success and intelligence

Perspective	R	R ²	R ² adjusted	pattern error est.
OI + CI + EI + MI	0.837	0.701	0.660	0.3942
OI + CI + EI	0.837	0.700	0.670	0.3881
OI + CI	0.834	0.696	0.676	0.3844
OI	0.831	0.691	0.681	0.3814

OBS. Business success as a dependent variable and the variables of business intelligence as independent variables.

Table 4: Statistics of business intelligence

Sample	N	Average	Deviation Pattern	Valor		Percentage	
				Min	Max	30	70
BI	34	4.7	0.72	3	6	4.4	5.0
EI	34	4.9	0.65	3	6	4.6	5.2
MI	34	4.9	0.89	3	7	4.4	5.4
CI	34	4.0	1.21	2	6	3.1	4.9
XI	34	4.6	0.73	3	6	4.3	4.9
OI	34	4.9	0.88	3	6	4.4	5.5