Business Intelligence systems
and organizational coordination

Thesis abstract

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1. The research purpose and question

The purpose of this research has been to analyze the effects on the organizational coordination generated by Business Intelligence systems (BIS) used within the enterprise.

The BIS strategic role in terms of performances and competitiveness improvement is currently recognized by the management.

The BIS focus is mainly on their potential pervasiveness due to the evolution of the technology used for their implementation. This evolution may be synthesized under two aspects: the first one is about the data (the ease and fast access to multiple heterogeneous sources, the capability to analyze huge amount of data using different tools, the effective presentation of the analysis results); the second one is concerning the simple use which allows to enlarge the number of potential users.

BIS could potentially support the decision making of all levels of the organization (from the strategic apex to the operating core).

However, from an in-depth analysis of organizational implications, a misalignment is being observed between the potential offered by these systems and their actual use, especially in order to set in motion efficient and effective coordination mechanisms allowing the reduction of uncertainty in the decision making processes.

Information and Communication Technologies (ICT), in particular BIS, intended as coordination technologies able to support the communication processes of knowledge and decisions among individuals who make interdependent tasks, may be evaluated for their contribution in improving existent coordination mechanisms and their capability to become their self some new coordination mechanisms.
In literature the studies about the ICT and coordination relationship are numerous. However, the BIS current researches highlight that the use of these systems is a relative new phenomenon which produces effects still limited and little investigated, particularly from the scientific point of view.

This research tries to be a contribution in a better understanding of this phenomenon.

The research question has been: *are Business Intelligence systems actually able to improve the coordination in terms of efficiency and effectiveness?*

Many different definitions of the concept of coordination have been given. Malone and Crowston (Malone and Crowston, 1994) have published a list of definitions that have been proposed for this word. Among these, the most appropriate one for this work is the following: *coordination is managing dependencies between activities.*

The empirical research has been based on the following hypothesis:

- *Hypothesis 1*: the use of BIS improves the decision making support.
- *Hypothesis 2*: the use of BIS allows decisional decentralization and reduces centralization of information power.
- *Hypothesis 3*: the use of BIS facilitates internal communication and collaboration.
- *Hypothesis 4*: the use of BIS facilitates knowledge sharing and diffusion.
- *Hypothesis 5*: the use of BIS reduces data access costs and data distribution costs.
• *Hypothesis 6*: the use of BIS reduces information processing costs.

• *Hypothesis 7*: the use of BIS reduces decisional costs.

• *Hypothesis 8*: the use of BIS reduces interdependencies management costs.

These hypothesis are based on some concepts referring Information Processing View and Transaction costs theory. Both theories deal with uncertainty and its relationship with the organizational coordination and the effects caused by the ICT use.

2. The empirical research

The research methodology (Walsham, 1995; Yin, 2003, Järvinen 2005, Eisenhardt, 1989) is a survey (empirical research) carried out on a sample of thirty enterprises located in Northern Italy and characterized by the use of a BI system by a large number of users (from top management to operational levels).

The survey was carried out by means of an interview with IS manager and some Users based on a questionnaire.

The time of use of the systems has been considered a fundamental and discriminating factor for the evaluation of the impacts of a BIS in the organization. For this reason, three clusters of companies were identified according to the years of use (1 to 3; 3 to 5; over 5).

Despite the small number, these companies are in any case heterogeneous in terms of industry and size, as required for the analysis.

The questionnaire contained questions relative to the following variables: *implementation time of the BI system* (1 to 3 years, 3 to 5 years, over 5
years); *technical/application functions* given by the usability of the system by the users at all levels of the organization; *factors affecting the coordination efficiency and effectiveness*.

In detail, the questionnaire includes the evaluation of two classes of macro-variables, i.e., technical/application functions and organizational (coordination) aspects.

Answers to the questions were given using a Likert scale, in which 1 was equal to the lowest and 5 to the highest, in order to guarantee homogeneity and easy interpretation and analysis of the questionnaires.

A univariate analysis of descriptive statistics was carried out. For each variable the following was calculated: position indexes (mean, mode and median) and variation indexes (standard deviation).

Two non-parametric tests were then elaborated, namely, the Kruskal-Wallis test and the Median test, in which the implementation time of the BI system was considered as a grouping variable, in order to identify the statistical significance of the potential relations between the BI system and the analyzed variables relative to both usability and coordination.

### 2.1. Findings

The answers to the questions on technical/application functions given by the usability of the system by the users at all levels were overall unanimous (variation coefficients are minimal) and in the high range (weighted average higher than 4; 4.140 to 4.593).

Considering the implementation time of the system, the values slightly increase as the number of years increases.
Overall it is fair to say that the technological potential of the BI system has been recognized by the respondents.

The answers to the questions on the factors affecting coordination show average values (weighted average) around 3 and variation coefficients of about 0.3. These answers are not as unanimous as those regarding the technological/application functions. However, also in this case the trend improves as the implementation time of the system increases.

According to the respondents, therefore, the system generates a few positive effects on coordination, although with less relevance with respect to the technological potential.

It should be noted that based on the Kruskal-Wallis and Median tests, statistically relevant relations that can provide a valid answer to the research question have been found only for a few analyzed variables.

Both tests confirm similar results. A relation has been found between the BIS and: the technical/application aspects; the effects on decisional decentralization

3. Conclusions

The results of the research show that these systems are mainly considered as technological tools, with little relevance being attributed to their potential in terms of facilitators of coordination efficiency and effectiveness.

The peculiarities of the system, such as usability at all company levels, have been recognized as factors enabling data usability and data transformation into knowledge.
Expressing a positive opinion on strictly technological aspects however does not imply the expression of a positive evaluation on more effective and efficient coordination mechanisms.

This seemingly confirms that ICT cannot alter the assets of the organizations even though the human factor cannot be ignored altogether. In fact, users retain the power to confirm, change or reject/annul the whole of its potential (Ciborra et al., 2004; Leidner and Kayworth, 2006).

Considering what has emerged from the analysis of the data, the benefits in terms of a more efficient coordination are narrow and they refer to a reduction of data access costs and distribution costs.

On the organizational side, the use of the system generates effects on organizational coordination mechanisms, such as greater decisional decentralization and slightly improved support to decision making (with decisional costs slightly lower).

Since the complexity of the analyses introduced by these systems considerably increases, from a qualitative and quantitative standpoint, the need emerges to enlarge the number of people that are in charge of these analyses. This might mean that the information management process becomes more “distributed” and less centralized. This decentralization process however does not appear to be an “intelligent” process, that is, a process able to improve internal communication and enable knowledge growth and sharing and to reduce interdependencies management costs.

Considering the large number of definitions of collaboration, it has been underlined the fact that collaboration is a knowledge-based process and therefore, makes use of knowledge and has a knowledge-rich outcome (Simonin, 1997). Contrary to what is stated by the literature, the purpose of computer-based systems, such as BISs, is not to allow and facilitate collabo-
ration as a process that is led (guided) by knowledge (Tsui, 2003). BIS technology does not emphasize aspects such as acquisition, selection, internalization, generation and externalization of knowledge as essential (Holsapple and Joshi, 2002; Hartono and Holsapple, 2004), but constitutes a tool to standardize data analysis processes.

These results confirm that users may fear losing power and value in the organization if they engage in sharing their knowledge with others through a BIS (Kankanhalli et al., 2005).

Paradoxically, it might seem that users use these systems not to improve the decision making process but only to increase its standardization.

The empirical research results show that only few hypothesis are confirmed.

Particularly, the following hypothesis are confirmed:

- *Hypothesis 1*: the use of BIS improves the decision making support.

- *Hypothesis 2*: the use of BIS allows decisional decentralization and reduces centralization of information power.

- *Hypothesis 5*: the use of BIS reduces data access costs and data distribution costs.

- *Hypothesis 7*: the use of BIS reduces decisional costs.

In fine, the answer to the research question can be partially affirmative.

However we are aware of the limited extent of the empirical research carried out.
It is necessary to enlarge the sample of companies and add other variables that are more related to the soft components of the organizations, since the role of users is always decisive for the purpose of a successful implementation of an ICT-based system.

4. Thesis references


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