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**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 an 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

Alchian A., Demsetz H. (1972), *Production, Information Costs, And Economic Organization*, The American Economic Review, 62, December.

Aldrich H.E. (1979), *Organizations and Environments*, Englewood Cliffs, Prentice-Hall, New York.

Anderson-Lehaman R., Watson H.J., Wixom B.H., Hoffer J.A. (2004), *Continental Airlines Flies With Real-Time Business Intelligence*, MIS Quaterly Executive, 3, 4, 163-176.

Arnott D., Pervan G. (2005), *A Critical Analysis of Decision Support Systems Research*, Journal of Information Technology, 20, 2, 67-87.

Arrow K. (1974), *The Limits of Organizations*, New York, Norton (trad. it. *I limiti dell'organizzazione*, Il Saggiatore, Milano, 1986).

Baccarach S.B. (1989), *Organisational theories: some criteria for evaluation*, Academy of Management Review, 14, 4, 496-515.

Balig H. (1986), *Decision rules and transactions, organizations and markets*, Management Science, 32, 1480-1491.

Balig H., Burton R. (1981), *Describing and designing organizational structures and processes*, International Journal of Policy Analysis and Information Systems, 5, 251-266.

- Balig H., Damon W. (1980), *Foundation for a systematic process of organization structure design*, Journal of Information and Optimization Sciences, 1, 133-165.
- Barkhi R., Rolland E., Butler J., Fan W. (2005), *Decision Support Systems Induced Guidance for Model Formulation and Solution*, Decision Support Systems, 40, 2, 269-281.
- Barney B.B., Ouchi W.G. (a cura di) (1986), *Organizational Economics*, Jossey-Bass, San Francisco.
- Benbasat, I., Goldstein D.K., Mead M. (1987), *The case research strategy in studies of information systems*, MIS Quarterly, 11, 3, 369-386.
- Bernardi G., Sordi C. (1978), *Come progettare la struttura aziendale*, ETAS, Milano.
- Bernhardt D.C. (1994), *I want it fast, factual, actionable – Tailoring Competitive Intelligence to Executives Needs*, Long Range Planning, 11, 3, 369-386.
- Bluedorn A.C. (1993), *Pilgrim's Progress: Trends and Convergence in Research on Organizational Size and Environment*, Journal of Management, 19, 163-191.
- Bonde A., Kuckuk M. (2004), *Real-World Business Intelligence: The Implementation Perspective*, DM Review, April.
- Bourgeois L. J. (1985), *Strategic goals, perceived uncertainty and economic performance in volatile environment*, The Academy of Management Journal, 28, 548-573.
- Bressand A., Distler C. (1995), *Le planète rationnel*, Flamorian, Paris.
- Brooks F. (1995), *The Mythical Man Month*, Addison-Wesley.

- Brynjolfsson E., Malone T. et al. (1994), *Does Information Technology lead to smaller firms?*, Management Science, 40, 12, 1628-1645.
- Burton B., Geishecker L., Schelegel K., Hostmann K., Austin B., Herschel T., Soejarto G., Rayner A. (2006), *Business Focus Shifts from Tactical to Strategic*, Gartner Research, Stamford, CT, May 22, <http://www.gartner.com>.
- Butera F. (1984), *La chiusura del cerchio: nuovi temi e contributi multidisciplinari sull'organizzazione*, Studi Organizzativi.
- Campbell D.T., Fiske D.W. (1959), *Convergent and discriminant validation by the multitrait-multimethod matrix*, Psychological Bulletin, 56, 2, 81-105.
- Camuffo A. (1997), *Le interdipendenze*, in Nacamulli R.C.D., Costa G. (a cura di), *Manuale di Organizzazione Aziendale*, UTET, Milano).
- Camuffo A., Cappellari R. (1997), *L'economia dei costi di transazione*, in Costa G., Nacamulli R.C.D. (a cura di), *Manuale di organizzazione*, UTET, Milano.
- Chandler A.D. Jr (1977), *The Visible Hand: The Managerial Revolution in American Business*, Cambridge, Mass. (trad. it. *La mano Invisibile: La rivoluzione Manageriale nell'Economia Americana*, FrancoAngeli, Milano, 1982).
- Child J. (1984), *New Technology and Development in Management Organization*, in OMEGA International Journal of Management Science, 2, 3.
- Ciborra C. (1987), *Reframing the Role of Computers in Organizations: The Transaction Costs Approach*, Office: Technology and People, 3, 17-38.
- Ciborra C. (1989), *Tecnologie di coordinamento*, FrancoAngeli, Milano.

- Ciborra C. (1993), *Teams, Markets and Systems*, Cambridge University Press.
- Ciborra C. (1996), *Lavorare assieme: Tecnologie dell'informazione e teamwork nelle grandi organizzazioni*, Etaslibri.
- Ciborra C., et al. (a cura di) (1981), *Informatica e Organizzazione*, FrancoAngeli, Milano.
- Ciborra C., Pugliese S. (1997), *La tecnologia*, in Costa G., Nacamulli R.C.D. (a cura di), *Manuale di Organizzazione Aziendale*, UTET, Milano.
- Ciborra C., Avgerou C. Land F. (2004), *The social study of information and communication technology*, Oxford University Press, New York.
- Clark D.T., Jones M.C., Armstrong C.P. (2007), *The dynamic structure of Management Support System: theory development, research focus, and direction*, MIS Quarterly, 31, 3, 579-615.
- Clark K. B., Fujimoto T. (1991), *Product Development Performance*, Harvard Business School Press, Boston, MA.
- Clarke R., McGuinness T. (Eds) (1987), *The Economics of the Firm*, Oxford, Blackwell.
- Cohen W., Levinthal D. (1990), *Absorptive Capacity : A New Perspective on Learning and Innovation*, Administrative Science 35, 128-152.
- Collins B. (1997), *Better Business Intelligence – How to Learn More about Your Company*, Astron On-Line, Letchworth.
- Cook T.E., Campbell D.T. (1979), *Quasi-Experimentation: Design and Analysis Issues for Field Settings*, Houghton Mifflin, Boston, MA.

- Cooper B.I., Watson H.J., Wixom B.H., Goodhue D.L. (2000), *Data Warehousing Supports Corporate Strategy at First American Corporation*, MIS Quarterly, 24, 4, 547-567.
- Cordella A., Simon K.A. (1997), *The Impact Of Information Technology On Transaction And Coordination Cost*, Viktoria Institute, Goteborg, Sweden.
- Costa G. (1983), *I paradigmi economici nei paradigmi organizzativi*, in A.A.V.V., *L'organizzazione nell'economia aziendale*, Giuffrè, Milano.
- Costa G., Gubitta P. (2004), *Organizzazione Aziendale. Mercati, gerarchie e convenzioni*, Milano, McGraw-Hill.
- Crawford A.B. Jr. (1982), *Corporate Electronic mail. A communication-intensive application of information technology*, MIS Quarterly, 6, 1-13.
- Daems H. (1983), *The Determinants of Hierarchical Organization of Industry*, in Francis A., Turk J., Willman P. (a cura di), *Power, Efficiency and Institutions*, Heinemann, Londra (trad. it. in Nacamulli R.C.D., Rugiadini A., 1985).
- Daft L. (2004), *Organization Theory and Design*, 8th Ed. South-Western College Publishing.
- Davenport T.D. (2006), *Competing on Analytics*, Harvard Business Review, August.
- Davenport T.H., Harris J.G. (2005), *Automated Decision Making Comes of Age*, MIT Sloan Management Review, Summer.
- De Marco M. (1992), *I sistemi informativi*, in De Marco M., Bruschi G., Manna E., Giustiniani G., Rossignoli C., *L'organizzazione dei sistemi informativi aziendali*, Il Mulino, Bologna.
- De Marco M. (2000), *I Sistemi Informativi Aziendali*, FrancoAngeli, Milano.

- Dekkers J., Versendaal J., Batenburg R. (2007), *Organising for Business Intelligence: A framework for aligning the use and development of information*, Proceedings 20th Bled eConference eMergence: Merging and Emerging Technologies, Processes and Institutions, Bled, Slovenia.
- Den Hamer P. (2005), *The organisation of Business Intelligence*, SDU Publishers, The Hague, Netherlands.
- Dess G.G., Beard D.W. (1984), *Dimensions of organizational task environments*, Administrative Science Quarterly, 29, 52-73.
- Dess, G. G., Oringer N. K. (1987), *Environment, structure, and consensus in strategy formulation: A conceptual integration*, Academy of Management Review, 12, 2, 313-330.
- Dresner H., Linden A., Buytendijk F., Friedman T., Strange K., Knox M., Camm M. (2002), *The Business Intelligence Competency Center*, Gartner Research, R-15-2248.
- Duncan R. (1972), *Characteristics of Organizational Environments and Perceived Environmental Uncertainty*, Administrative Science Quarterly, 17, 313-327.
- Duncan R., Weiss A. (1979), *Organizational Learning: Implications for Organizational Design*, Research in Organizational Behavior, Greenwich, B.M. Staw (Ed), JAI Press Inc., CT, 75-123.
- Eckerson W.W. (2002), *The Decision Support Sweet Spot*, Journal of Data Warehousing, 7, 3, 4-9.
- Eckerson, W.W. (2006), *Performance Dashboards*, John Wiley & Sons, Hoboken, NJ.
- Edmunds A., Morris A. (2000), *The problem of information overload in business organizations: a review of the literature*, International Journal of Information Management, 20, 1, 17-28.

- Eisenhardt K.M. (1989), *Building Theories from Case Study research*, Academy of Management Review 14, 4, 532-550.
- Eisenhardt K., Bourgeois L.J. (1988), *Politics of strategic decision making in high velocity environments: Toward a mid-range theory*, Academy of Management Journal, 31, 737-770.
- Emery F.E., Trist L. (1965), *The Casual Texture of Organizational Environments*, Human Relations, 18, 21-32.
- Feldman M.S., March J.G. (1981), *Information in organizations as signal and symbol*, Administrative Science Quarterly, 26, 171-186.
- Ferrando P. (1997), *L'incertezza e l'ambiguità*, in Nacamulli R.C.D., Costa G. (a cura di), *Manuale di Organizzazione Aziendale*, UTET, Milano.
- Fiol C.M., Lyles M.A. (1985), *Organizational Learning*, Academy of Management Review, 10, 4, 803-813.
- Fiol C.M., O'Connor E.J. (2003), *Waking up! Mindfulness in the face of bandwagons*, Academy of Management Review, 28, 1, 54-70.
- Fowler T.B. (1997), *Internet access and pricing: Sorting out the options*, Telecommunications, 31, 20.
- Frohlich M. (1998), *The implementation of advanced manufacturing technologies: an empirical study of surface mount technology*, Boston University, Boston, MA, unpublished DBS Thesis.
- Galbraith J. (1973), *Designing Complex Organizations*, Addison-Wesley, MA.
- Galbraith J. (1977), *Organizational Design*, Addison-Wesley, MA.
- Gallino L. (1983), *Informatica e qualità del Lavoro*, Torino, Einaudi.
- Gersick C. (1988), *Time and transition in work teams: Toward a new model of group development*, Academy of Management Journal, 31, 9-41.

- Ghosthal S., Kim S.K. (1986), *Building Effective Intelligence Systems For Competitive Advantage*, Sloan Management Review, 28, 1, 49-58.
- Giddens A. (1984), *The Constitution of Society: Outline of the Theory of Structure*, University of California Press, Berkeley, CA.
- Gilad B., Gilad T. (1986), *SMR Forum: Business Intelligence – The Quiet Revolution*, Sloan Management Review, 27, 4, 53-61.
- Glaser B., Strauss A. (1967), *The discovery of grounded theory: Strategies of qualitative research*, London: Wiedenfeld and Nicholson.
- Gold A.H., Malhotra A., Segars A.H. (2001), *Knowledge Management: An Organizational Capabilities Perspective*, Journal of Management Information Systems, 18, 1, 185-214.
- Grandori A. (1988), *L'analisi dei costi per la progettazione organizzativa*, Sviluppo e Organizzazione, 105, Gen-Feb.
- Grandori A. (1995), *L'organizzazione delle attività economiche*, Il Mulino, Bologna.
- Grandori A. (1999), *Il coordinamento organizzativo fra imprese*, Sviluppo & Organizzazione, 171.
- Grover V., Davenport T.D. (2001), *General Perspectives on Knowledge Management: Fostering a Research Agenda*, Journal of Management Information Systems, 18, 1, 5-21.
- Halliman C. (2000), *Business Intelligence Using Smart Techniques*, Information Uncover, Houston.
- Handfield R.S., Melnyk S.A. (1998), *The scientific theory-building process: a primer using the case of TQM*, Journal of Operations Management, 16, 321-339.

- Harris S., Sutton R. (1986), *Functions of parting ceremonies in dying organizations*, *Academy of Management Journal*, 29, 5-30.
- Hartono E., Holsapple C. (2004), *Theoretical foundations for collaborative commerce research and practice*, *Information Systems and e-business Management*, 2, 1-30.
- Harvey E. (1968), *Technology and the Structure of Organizations*, *American Sociological Review*, 33, 241-259.
- Herbst H. (1976), *Alternatives to Hierarchies*, Mennen, Astén.
- Herring J.P. (1992), *The role of intelligence in formulating strategy*, *The Journal of Business Strategy*, 13, 5, 54-60.
- Hicks M. (2001), *Getting Pricing Just Right*, *eWeek*, 18, 46.
- Hinshaw F. (2004), *Data Warehouse Appliances Driving the Business Intelligence Revolution*, *DM Review*, September, 30-34.
- Hoegl M., Weinkauff K., Gemuenden H.G. (2004), *Inter-team Coordination, Project Commitment, and Teamwork in Multi-team R&D Projects: A Longitudinal Study*, *Organization Science*, 1, 38-55.
- Holsapple C.W., Joshi K.D. (2002), *Knowledge manipulation activities: Results of a Delphi study*, *Information and Management*, 39, 6, 477-490.
- Hult G.T.M. (2003), *An Integration of Thoughts on Knowledge Management*, *Decision Sciences*, 24, 2, 189-195.
- Hyer N.L., Brown K. (1999), *The discipline of real cells*, *Journal of Operations Management*, 17, 557-574.
- Järvinen P. (2005), *Collaboration and Research Methods*, in Berleur J., Avgerou C. (Eds), *Perspectives and Policies on ITC in Society: an IFIP TC9*, Springer, Boston.

- Jick T.D. (1979), *Mixing qualitative and quantitative methods: triangulation in action*, *Administrative Science Quarterly*, 24, 602-611.
- Jones G. R. (2007), *Organization theory, design and change*, Prentice Hall.
- Jurkovich R. (1974), *A Core Typology of Organizational Environments*, *Administrative Science Quarterly*, 19, 380-394.
- Kahaner L. (1997), *Competitive Intelligence: From Black Ops to boardrooms – How Businesses Gather Analyze and Use Information to Succeed in the Global Marketplace*, Simon & Schuster, New York.
- Kahneman D., Tversky A. (1973), *On the psychology of prediction*, *Psychological Review*, 80, 237-251.
- Kalakota R., Robinson M. (2000), *e-Business 2.0 – Roadmap for Success*, Addison-Wesley, Boston.
- Kankanhalli A., Tan B.C.Y., Wei K.K. (2005), *Contributing Knowledge to Electronic Knowledge Repositories: An Empirical Investigation*, *MIS Quarterly*, 29, 1, 113-143.
- Katzer J., Fletcher P.T. (1992), *The information environment of managers*, *Annual Review of Information Science and Technology (ARIST)*, 27, 227-263.
- Kemper H., Baars H. (2006), *Business Intelligence und Competitive Intelligence-IT-basierte Management unterstzung und marktwettbewerbsorientierte Anwendungen*, in: Kemper H., Heilmann H., Baars H. (2006), *Business & Competitive Intelligence*, Heidelberg.
- Langefors B. (1974), *System för företagsstyrning*, Lund: Studentlitteratur.
- Lanzara G.F. (1993), *Capacità negativa*, Il Mulino, Bologna.
- Lawrence P., Lorsch J. (1967), *Organization and Environment*, Harvard Business School Press, Cambridge.

- Lawrence P., Lorsch J. (1969), *Developing Organizations: Diagnosis and Action*, Addison-Wesley, MA.
- Leavitt H.J., Whisler T.L. (1958), *Management in the 1980's*. Harvard Business Review, 36, 41-48.
- Leidner D.E., Kayworth T. (2006), *A review of culture in information system research: toward a theory of information technology culture conflict*, MIS Quarterly, 30, 2.
- Leonard-Barton D. (1990), *A dual methodology for case studies: synergistic use of a longitudinal single site with replicated multiple sites*, Organization Science, 1, 1, 248-266.
- Lönnqvist A., Pirttmäki V. (2006), *The measurement of Business Intelligence*, www.ism-journal.com.
- Lorsch J. (1970), *Introduction to the Structural Design of Organizations*, in Dalton G., Lawrence P., Lorsch J., (Eds), *Organizational Structure and Design*, Homewood, IL: Irwin and Dorsey, 1970).
- Lorsch J., Lawrence P. (1972), *Environmental Factors and Organizational Integration*, in Lorsch J., Lawrence P., (Eds), *Organizational Planning: Cases and Concepts*, Homewood, IL: Irwin and Dorsey, 1972).
- Lotus (1989), *Lotus Notes Users Guide*, Lotus Development Corp., Cambridge, Mass.
- Luhn H.P. (1958), *A Business Intelligence System*, IBM Journal, October, 314-319.
- Mackenzie K. D. (1978), *Organizational Structures*, AHM Publishing Corporation.
- Malhotra A., Gosain S., El Sawy O.A. (2002), *Absorptive Capacity Configurations in Supply Chains: Gearing for Partner-Enabled Market Knowledge Creation*, MIS Quarterly, 8, 1, 145-187.

- Malone T.W. (1987), *Modeling coordination in organizations and markets*, Management Science, 33, 1317-1322.
- Malone T.W., Crowston K. (1994), *The Interdisciplinary Study of Coordination*, ACM Computing Surveys, 26, 1, 87-119.
- Malone T.W., Smith S.A., (1988), *Modeling the performance of organizational structures*, Operation Research, 36, 3, 421-436.
- Malone T.W., Yates J., Benjamin R. (1987), *Electronic Markets And Electronic Hierarchies*, Communications Of Acm, 6, 485-497.
- March J. G. (1991), *Exploration and Exploitation in Organizational Learning*, Organization Science, 2, 1, 71-87.
- March J.G., Simon H.A. (1958), *Organizations*, Chichester, Wiley (trad. it. *Teoria dell'organizzazione*, Edizioni di Comunità, Milano, 1979).
- Martinez M. (2004), *Organizzazione, informazioni e tecnologie*, Il Mulino, Bologna.
- Massey A.P., Montoya-Weiss M.M., O'Driscoll T.M. (2002), *Knowledge Management in Pursuit of Performance: Insights from Nortel Networks*, MIS Quartely, 26, 3, 269-289.
- McCann J. E., Selsky J. (1984), *Hyper-turbulence and the Emergence of Type 5 Environments*, Academy of Management Review, 9, 460-470.
- Meredith J. (1998), *Building operations management theory through case and field research*, Journal of Operations Management, 6, 441-54.
- Meredith J., Vineyard M. (1993), *A longitudinal study of the role of manufacturing technology in business strategy*, International Journal of Operations & Production Management, 13, 12, 4-24.
- Miles M., Huberman A.M. (1984), *Qualitative data analysis*, Beverly Hills, CA: Sage Publications.

- Milgrom P., Roberts J. (1992), *Economics, Organization and Management*, Prentice Hall.
- Mintzberg H. (1979), *The Structuring of Organizations*, Prentice-Hall, Englewood Cliffs, N.J.
- Mintzberg H. (1983), *Structure in fives. Designing effective organizations*, Upper Sadler River, N.J, Prentice Hall (trad. it. *La progettazione delle organizzazioni*, Il Mulino, Bologna, 1985).
- Mintzberg H. (1996), *La progettazione dell'organizzazione aziendale*, Il Mulino.
- Mintzberg H., Waters J. (1982), *Tracking strategy in an entrepreneurial firm*, Academy of Management Journal, 25, 465-499.
- Moe T.M. (1984), *The New Economics of Organization*, American Journal of Political Science, 28 (trad. it. in Brosio G., (a cura di), *La teoria economica dell'organizzazione*, Il Mulino, Bologna).
- Morabito V. (1999), *Il Valore Organizzativo dei Sistemi ERP: L'impatto sui Costi di Transazione*,
[Http://Www.Sdabocconi.It/Ticonzero_Private/9906/Morabito](http://www.sdabocconi.it/Ticonzero_Private/9906/Morabito).
- Moss L.T., Atre S. (2003), *Business Intelligence Roadmap: The Complete Project Lifecycle for Decision-Support Applications*, Addison-Wesley, Boston, MA.
- Mukherjee A., Mitchell W., Talbor F.B. (2000), *The impact of new manufacturing technologies and strategically flexible production*, Journal of Operations Management, 18, 139-168.
- Nacamulli R.C.D., Rugiadini A. (1985), *Organizzazione E Mercato*, Bologna, Il Mulino.
- Narasimhan R., Jayaram J. (1998), *Reengineering service operations, a longitudinal case study*, Journal of Operations management, 7-22.

- Negas S., Gray P. (2003), *Business Intelligence*, Proceedings of the Ninth American Conference on Information Systems, Tampa, Florida.
- Nisbett R., Ross L. (1980), *Human Inference: strategies and shortcomings of social judgment*, Englewood Cliffs, NJ: Prentice-hall.
- Nonaka I., Takeuchi H. (1995), *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press, New York.
- Odlyzko A.M. (2000), *Internet growth: Myth and reality, use and abuse*, IMP: Information Impacts Magazine, 2000.
- Perrone V. (1990), *Le Strutture Organizzative D'impresa*, Egea.
- Perrow C. (1967), *A Framework for the Comparative Analysis of Organizations*, American Sociological Review, 32, 194-208.
- Pfeffer J. (1978), *Organizational Design*, Carlington Heightes, Ill., AHM.
- Philips E., Vriens D. (1999), *Business Intelligence*, Kluwer Bedrijfsinformatie B. V., Deventer, Netherlands.
- Picot A., Dietl H., Franck E. (1997), *Organisation: eine ökonomische Perspektive*, Schäffer-Poeschel, Stuttgart.
- Pontiggia A. (1997), *Organizzazione dei sistemi informativi*, Etas, Milano.
- Poon P., Wagner C. (2001), *Critical Success Factors Revisited: Success and Failure Cases of Information System for Senior Executives*, Decision Support Systems 30, 4, 392-418.
- Power D.J. (2003), *A Brief History of Decision Support Systems*, DSSResource.com, World Wide Web, <http://DSSResource.com/history/dsshhistory.html>, version 2.8, May 31.
- Putterman L. (a cura di) (1986), *The Economic Nature of the Firm*, Cambridge, Cambridge U.P.

- Robins J.A. (1987), *Organizational Economics: Notes on the Use of Transaction Cost Theory in the Study of Organizations*, Administrative Science Quarterly, 20.
- Rockart J.F., Short J.E. (1989), *IT and the networked organizations: Toward more effective management of interdependence*, Management in the 1990s Research Program Final Report, Mass, Massachusetts Institute of Technology.
- Rosenkopf L., Tushman M. (1992), *On the Co-evolution of Technology and Organization*, in Baum J., Singh J. (Eds) *Evolutionary Dynamics of Organizations*, Oxford University Press, Oxford.
- Rossignoli C. (2004), *Coordinamento e cambiamento. Tecnologie e processi interorganizzativi*, FrancoAngeli, Milano.
- Rossignoli C., Ferrari A. (2006), *Le implicazioni organizzative di sistemi di Business Intelligence ai fini della riduzione della complessità aziendale*, in Mercurio R. (a cura di), *Organizzazione, regolazione e competitività*, McGraw-Hill, Milano.
- Rouibah K., Ould-ali S. (2002), PUZZLE: *A Concept and Prototype for Linking Business Intelligence to Business Strategy*, Journal of Strategic Information Systems, 11, 133-152.
- Rullani E. (1984), *La teoria dell'impresa: soggetti, sistemi, evoluzioni* in Rispoli M., *L'impresa industriale*, Bologna, Il Mulino.
- Rugiadini A. (1985), *Organizzazione e Mercato*, Bologna, Il Mulino.
- Rullani E. (1986), *Economia delle transazioni e informazioni: saggio sulla nuova teoria economica dell'organizzazione*, in A.A.V.V., *Annali di storia dell'impresa*, 2, FrancoAngeli, Milano.
- Rullani E. (1996), *Complessità e Informazione nella Scienza Economica*, Pluriverso, 2.

- Salonen J., Pirttimäki V. (2005), *Outsourcing a Business Intelligence Function*, Frontiers of e-business research.
- Sammon D., Finnegan P. (2000), *The Ten Commandments of Data Warehousing*, Database for Advances in Information Systems, 31, 4.
- Scott J., Globe A., Schiffer K. (2004), *Jungles and Gardens: The Evolution of Knowledge Management at J. D. Edwards*, MIS Quarterly Executive, 3, 1, 37-52.
- Scott Morton M.S. (1984), *The State of the Art of Research. The Information Research Challenge*, Boston F.W., McFarlan (Ed), Harvard University Press, 13-41.
- Scott R.W. (1981), *Organizations: Rational, Natural, and Open Systems*, Prentice Hall, Englewood Cliffs, NJ (trad. it. *Le Organizzazioni*, Il Mulino, Bologna, 1994).
- Sharda R., Steiger D.M. (1996), *Inductive Model Analysis Systems: Enhancing Model Analysis in Decision Support Systems*, Information Systems Research, 7, 3, 328-341.
- Shrivastava P.A. (1983), *Typology of organizational learning systems*, Journal of Management Studies, 20, 1-28.
- Siggelkow N. (2007), *Persuasion with case studies*, Academy of Management Journal, 50, 1, 20-24.
- Simon H.A. (1972), *Theories of Bounded Rationality*, in McGuire C., Radner R. (Eds), *Decision and Organization*, New York, North Holland.
- Simonin B.L. (1997), *The importance of collaborative know-how: An empirical test of the learning organization*, Academy of Management Journal, 40, 5, 1150-1174.
- Solomon M. (2005), *Ensuring a Successful Data Warehouse Initiative*, Information Systems Management Journal, Winter.

- Sprague R.H. Jr., Carlson E.D. (1982), *Building Effective Decision Support Systems*, Englewood Cliffs, NJ, Prentice-Hall.
- Stein E.W., Vandenbosch B. (1996), *Organizational Learning During Advanced Systems Development: Opportunities and Obstacles*, *Journal of Management Information Systems*, 13, 2, 115-136.
- Tennant R. (2002), *The Importance of Being Granular*, *Library Journal*, 127, 9.
- Thompson J.D. (1967), *Organizations in Action*, McHraw-Hill, New York (trad. it. *L'azione organizzativa*, Isedi, Torino, 1988).
- Thomsen E. (2003), *BI's Promised Land*, *Intelligent Enterprise*, 6, 4, 21-25.
- Toffler A. (1970), *Future Shock*, Bantam Books, New York.
- Tsui E. (2003), *Tracking the role and evolution of commercial knowledge management software*, *Handbook on Knowledge Management*, 2, 5-27.
- Tung R.L. (1979), *Dimensions of Organizational Environments: An Exploratory Study of Their Impact on Organizational Structure*, *The Academy of Management Journal*, 22, 672-693.
- Tushman M. L., Nadler D.A. (1978), *Information Processing as an Integrating Concept in Organizational Design*, *The Academy of Management Review*, 3, 3, 613-624.
- Van Beek D. (2004), *The Intelligent Organisation, Performance Improvement and Organisational Development with Business Intelligence*, Publisher Tutein Nolthenius, Den Bosch, The Netherlands.
- Van De Ven A.H. (1989), *Nothing is quite as practical as a good theory*, *Academy of Management Review*, 14, 4, 486-489.

- Van de Ven A.H., Delbecq A.L., Koenig R. Jr (1976), *Determinants of coordination modes within organizations*, American Sociological Review.
- Voss C., Tsiriktsis, Frohlich M. (2002), *Case research in operations management*, International Journal of Operations & Production Management, 22, 2, 195-219.
- Wacker J.G. (1998), *A definition of theory: research guidelines for different theory building research methods in operations management*, Journal of Operations Management, 16, 361-385.
- Watson H.J., Fuller C., Ariyachandra T. (2004), *Data Warehouse Governance: Best Practices at Blue Cross and Blue Shield of North Carolina*, Decision Support Systems, 38, 435-450.
- Weick K.E. (1985), *Cosmos versus Chaos: Sense and Nonsense in Electronic Contexts*, Organizational Dynamics, 14, 2, 50-64.
- Weick K.E. (1990), *Technology as Equivoque: Sensemaking in New Technologies*, in Goodman P.S., Sproull L.S. et al., *Technology and Organization*, Jossey-Bass, San Francisco.
- Williams S., Williams N. (2007), *The Profit Impact of Business Intelligence*, Morgan Kaufman, San Francisco, CA.
- Williamson O. (1975), *Markets And Hierarchies: Analysis And Antitrust Implications*, The Free Press, New York.
- Williamson O.E. (1981), *The Economic of Organization: The Transaction Cost Approach*, American Journal of Sociology, 87, 548-77 (trad. it. *L'economia dell'organizzazione: l'approccio dei costi di transazione*, in Nacamulli R.C.D., Rugiadini A. (a cura di), *Organizzazione e Mercato*, Il Mulino, Bologna, 1985).

- Williamson O. (1985), *L'economia dell'organizzazione*, in Nacamulli R.C.D., Rugiadini A. (a cura di), *Organizzazione e Mercato*, Il Mulino.
- Williamson O.E. (1986), *Economic Organization*, Wheatsheaf Books, Brighton (trad. It. *L'organizzazione economica*, Il Mulino, Bologna, 1991).
- Williamson O.E. (1994), *Research Needs and Opportunities in Transaction Cost Economics*, Journal of the Economics of Business, 1.
- Wixom B.H., Watson H.J. (2001), *An Empirical Investigation of the Factors Affecting Data Warehousing Success*, MIS Quarterly, 25, 1, 17-41.
- Woodward J., (1965), *Industrial Organization: Theory and Practice*, Oxford University Press, London.
- Yin R. (1981), *The case study crisis: Some answers*, Administrative Science Quarterly, 26, 58-65.
- Yin R. (1984, 1994), *Case study research*, Sage Publications, Beverly Hills, CA.
- Yin R. (1989), *Case Study Research: Design and Methods*, Sage, Newbury Park, California.
- Zahra S.A., George G. (2002), *Absorptive Capacity: A Review, Re-conceptualization, and Extension*, Academy of Management Review, 27, 2, 185-203.
- Zaltman G., Duncan R., Holbek J. (1973), *Innovation and Organizations*, Wiley, New York.
- Zamarian M. (2002), *Le routine organizzative*, Torino, UTET.
- Zwerman W.L. (1970), *New Perspectives on Organizational Effectiveness*, Westport, Greenwood.