

# **Systems Theory and Logistical Management to Sustain e-Business Propositions**

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## **Abstract**

This paper presents and integrates an overview of systems' theory and supply chain management developments in the era of network emergence, thus complementing technological e-business approaches. It concludes that e-business, as developed and presented for several authors, is far from reality and from what companies are needing, because it does not present genuine innovative concepts and, also, because it is too much technology focused.

## **Keywords**

Systems theory, supply chain management (SCM), e-business, complete e-business, network management

## **1 Introduction**

Jay W. Forrester made the first approach to a management problem that explicitly claimed to rely upon system's theory in the late fifties (Forrester 1989). The inventory "ups and downs" suffered by the General Electric household appliances plants in Kentucky were then explained using a computer model developed in accordance with the principles of systems control theory (Forrester 1959). The methodology was initially called industrial dynamics (Forrester 1961), before its general character made it known as system dynamics.

One of the major impacts of Forrester's work was the recognition that only system approaches could provide a deep insight on complex dynamic behaviours such as the bullwhip effect (Lau *et al.* 1997). The network configuration of today's supply chains with an ever-increasing number of partners—each one following its own strategy and taking actions that do not always fit with the common objectives—, the fuzzy nature of many of their inter-relationships, and the dynamic character of all the variables recommend a system approach if one looks for an effective supply chain management (SCM) (Simchi-Levi *et al.*, 2000, Sterman 2000).

This paper surveys several issues on SCM that call for a system approach and briefly reviews the background and main ideas currently in use. Next, the general ideas are put at work by approaching e-business as a model that integrates companies and their partnerships in the context of the network era. Some "principles" are proposed, which put in question a well-known view of how e-business integrates the physical and digital dimensions, and helps to create networks of companies focused on serving markets and benefiting from high levels of customer retention. Finally, the paper presents some empirical evidence to support the ideas presented.

## 2 Systems, complexity and system approaches to management

Scientific methods based on cartesianism and reductionism, so successful in the physical sciences, first came across its limitations and drawbacks in biology. The modern concept of system, formulated around 1930 by von Bertalanffy—following previous works by Leduc and Bogdanov (Bertalanffy 1968)—spread out to all fields of knowledge and became the current scientific paradigm.

Systems' theory focus the problems raised by complex entities that are perceived as a whole—i.e. that are more than just the sum of its components—and exhibit properties that can not be derived from its parts. Among the main features that most systems share, it is important to emphasise (Le Moigne 1977):

- Every system has a structure, which is the set of its components plus the set of rules defining their interrelationships;
- Every system has a teleological character, i.e. is driven towards a set of goals, which is equivalent to say that every system has a purpose;
- Every system interacts with its environment, performing activities that change the system's state in order to approach the established goals. In the course of this evolution and due to the presence of feedback loops, the system's structure, the set of goals and the environment change continuously. A system that interacts with its environment, influencing it, is said to be an open system.

Complexity in a system usually results from two different sources: detail complexity and dynamic complexity.

Detail complexity occurs when the system has a large number of components and is related to the difficulty the human brain has in dealing with many variables at the same time. Dynamic complexity has a different character and is a consequence of the system's structure. It is related to the ability that systems have to exhibit emergent behaviours i.e. dynamic changes in their states that cannot be derived from the parts, but are a property of the whole. They can only be understood if one looks at the system's structure, namely at (1) the causal loops originated by feedback, (2) the time delays that occur between an action and its effect, and (3) the non-linear character of most relationships.

These three properties are the main causes for dynamic complexity: in a linear process, inputs are transformed in outputs and, whenever time effects are present, outputs are separated from inputs by a time interval; past influences the present (Richardson, 1999). In more complex processes, however, the result of an action causes, also usually after a time delay, modifications of the pre-existing conditions that determined that action. Information about the output is fed back to the system as a new input, leading to a corrective action that changes the output (once again after some delay). A simple cause-effect relationship is then replaced by a causal feedback loop—which introduces a non-linearity.

Time delays, feedback loops, fuzzy variables and dynamic environments are features easily recognised by everyone in today's businesses. They are the root causes for the bullwhip effect and lots of other counterintuitive behaviours presented by social systems (Forrester 1971). It is thus not surprising that system approaches are now commonly recommended and used in many situations (Checkland *et al.* 1999, Gharajedaghi 1999, Sterman 2000).

The model is another concept that is important to highlight, when one starts to look for ways of developing a system approach. The concept of model is so strongly linked to the concept of system that Le Moigne considers the theory of the general system as the theory of modelling (Le Moigne 1977).

A model is a simplified representation of the reality that is useful for solving a problem. Or “the purpose of a simulation model is to mimic the real system so that its behavior can be studied” (Sterman 1991). And, as many authors refer, the model’s development is driven by the search of a solution to the problem to be solved (Forrester 1961, Sterman 2000).

Developing a model is thus an evolutionary complex social process that helps the group of modellers (1) to explicit their ideas about the problem, (2) to identify the features and variables that are relevant to the problem, (3) to achieve a consensus about the problem’s nature and delimitation, (4) to get an insight about the system’s structure, and (5) to build a construct accepted as a valid representation of the real system. This modelling process is possible because most of the systems have a hierarchical structure: at a given level, the system properties are dependent of the underlying levels only in a very broad manner. Therefore, the study the system’s behaviour at a given level does not require a detailed representation of the levels below, but demands just the description of the structure and behaviours at the level at stake (Simon 1981, Simon 1990).

A model that offers a representation suitable for the solution of the problem on focus may be used in simulation, which is an experiment performed on the model. Simulations are extremely useful when ethical, economic, or purely practical considerations prevent experimenting with the real system, and through simulation one can also “compress the time” and study in a few minutes or hours what would take years to happen in the real world. These considerations, valid for every system, are particularly relevant when dealing with social systems, where experimentation poses tough methodological issues that cannot be easily overcome.

The general availability of computers and their ability to easily store and process large amounts of information, and to solve thousands of interrelated equations, offer a cheap and powerful way to develop system models and simulate the system’s behaviour in a wide range of different scenarios. The output of a consistent set of simulations can be a forecast, as in the case of econometric models, the evaluation of the impact of different environment conditions or internal decision policies, or the outcome of different strategies. Furthermore, through simulation, some unexpected behaviour can be identified and understood, and new policies can be designed to prevent them (Forrester 1971, Simon 1981).

With this background in perspective, it is nor surprising that systems thinking, computer models and simulation are being increasingly used in the last decades as a powerful aid to solve management problems.

It was in the management of large modern engineering projects—starting with the military projects launched in the first years of the cold war—that the high levels of complexity first made unavoidable a system approach (Hughes, 1998). The trend widened soon to other fields, following the systems thinking movement launched by Russel Ackoff and pursued by many others (Jackson 1999), until the recent attempts to “manage at the edge of chaos” (Stacey 1995, Beinhocker 1997, Brown, *et al.* 1998, and many others). Genetic algorithms, cellular automata, evolutionary game theory, fuzzy-logic, agent-based models, real options, soft systems methodologies and system dynamics are some of the methodologies and tools developed in the last years to deal with complexity and that have application in economics and management.

Applications range from helping to design “social artefacts” (Simon, 1981), to the exploration of the internal structure of a complex entity, and encompasses activities so different as executive training, design of robust decision policies, evaluation of strategic options, support to change management processes, and the development of the “learning organisation” (Senge 1990).

### 3 The push for a system approach to SCM

The acceleration suffered by the economy and the businesses during the last years increased the number of those who believe that systems thinking provide the most effective approaches to many of the managers' problems.

The dynamics of the environment is the outcome of a large set of different causes linked together in complex networks, where feedback and non-linear relationships are the rule.

The background to this situation is provided by the fundamental role played by the technological evolution. Information and communications technologies are usually mentioned, even if it cannot be forgotten that very simple and non-sophisticated devices like the standardised container (Krugman 1997) are often in the origin of large reductions of lead times and of enormous increases in productivity. Today, using different technologies anyone can communicate directly to anyone, anywhere, and people and goods can move from a continent to another in a matter of a few hours. Every branch of specialised knowledge is freely available to anyone who has access to the Internet.

Easiness and speed of travel of people and transportation of goods, together with the diffusion and the general accessibility of information offered to businessmen the possibility of targeting world markets, and provided the basic conditions for the integration of most of the large economies. The general movement in the direction of globalisation took easily place and accelerated when the collapse of the Soviet Union and the East European socialist block created the appropriate political and social conditions for liberalisation of trade and deregulation of markets. And to remain competitive in a global economy, many businesses have to pursue large economies of scale, an economic imperative that led to design new political associations ensuring larger "domestic" markets, such as the European Union, NAFTA, Mercosur or ASEAN.

All this evolution took place at an increasingly quick pace. A century ago, sailing ships made most of the sea trade; forty years ago propeller airplanes offered travel possibilities at an almost unbearable price; twenty years ago the telex was the standard technology available for rapid transfer of information between two companies.

Any manager who envisages staying in business has to be flexible and adapt his company to all these changes, and has to do it very fast, in spite of the volatility of exchange rates and oil prices, and the crushing pressure of the financial markets. In order to survive, today, no single company can succeed by itself. The days when a company like Ford could transform, in a single plant, coal and iron into cars are over, as *The Economist* (Anonymous 2002) recently remarked. Focus on the core business, and outsource everything that someone else can do better and cheaper became the dominant trend and a rule of the game.

In our times of globalisation of economies, markets and knowledge, the boundaries of the firm are fuzzy, the extended enterprise appears as the new industrial paradigm, and supply chain management is recognised—if not yet logistics network management (Carvalho 2001 a)—as an important piece of corporate strategy (Gattorna *et al.* 1996). Making the fundamental strategic "make-or-buy" decision is increasingly tough, when economies and businesses compete in a global economy, with competition going in parallel with cooperation: two fierce competitors in one market must cooperate in another one, if they want to succeed. Buyers and sellers look for long-term alliances and become business partners. Sell and buy on a point basis is replaced by outsourcing, and the management of the value system replaces the management of the value chain. As stated in a recent paper, "the ultimate core competency of an organization is 'supply chain design', which I define as choosing what capabilities along the value chain to invest in and develop internally and which to allocate for development by suppliers" (Fine 2000). Managing a business becomes indissociable of the management of the partners' network.

A network is a complex system of entities and relationships, processes and flows, and therefore cannot be efficiently managed—either at a strategic or at an operational level—without relying upon a system approach.

The reason for this arises in part from the large number of partners and other stakeholders—each one with its own set of objectives—the huge amounts of data, the multidisciplinary expert knowledge needed, and the frequent novelty of the situations that are present in SCM.

However, internal dynamic complexity is usually more relevant: linear processes and simple one-to-one relationships are not the rule anymore. Multiple choices, bifurcating paths, conflicting goals, information feedback, variable time delays, and other elements that originate non-linearities are part of the daily life of today's supply chain manager. And, since the effects of all these are amplified by the dynamics of the external environment, the complexity of each problem in SCM tends always to rise.

In such a situation only a consistent model can efficiently help to find a solution.

The portfolio of problems that can be solved with simulation is almost unlimited and only a very brief outline can be presented here.

At an operational level, resource allocation, co-ordination of inventory decisions and transportation decisions, and matching supply and demand are some of the problems in SCM usually covered by textbooks (Christopher, 1992, Gattorna *et al.* 1996, Simchi-Levi *et al.*, 2000) that are easily perceived as requiring a system approach. Models can provide the basis for answering “what-if” questions through simulation, and for finding robust decision policies and optimal decisions.

Distribution strategies, network configuration, organisation design, supply chain integration, strategic alliances and information systems design are some of the strategic decision making processes where a powerful set of methodologies and techniques using scenario planning and simulation can offer a valuable contribution.

Recently, a newspaper reported on the application of agent-based modelling to the daily scheduling and distribution planning of Air Liquide US operations (Lloyd 2002). The problem is NP-complete, which means that no algorithm is known to solve it in a time that varies polynomially with the number “n” of basic variables, and it is widely believed that no such algorithm exists. At the current state of knowledge, the best that can be reasonably expected is to find an algorithm that could solve the problem in a time varying exponentially with “n”. However, the computer model is able to suggest a workable solution taking into account that 10,000 sites have to be served from more than 200 sources with 100 tractor units and 300 trailers.

Many other applications are reported in the literature, covering matters like the supply chain dynamics (Swaminathan *et al.* 1998, Fukunaga *et al.* 2000, Groothedde 2000, Anderson *et al.* 2000), partners' management (Sobrero *et al.* 2002), performance analysis (Cakravastia *et al.* 1999), decision policies (Strohhecker 2000), and integration of product management with order strategies (Barlas *et al.* 1996).

Executive training is another area where computer models have a long and successful story with applications to teach SCM dynamics widely used. The dynamics of the supply chain provides the background for the beer distribution game (Sterman 1989, Senge 1990) originally developed at the Massachusetts Institute of Technology and in use for more than thirty years to educate managers in systems thinking. Other similar games are available, focusing some specific issues (Anderson *et al.* 2000). However, it is important to notice that several researchers (Sterman 1994, Moxnes 1998) frequently report on the difficulties humans have to deal with complexity and on the learning problems faced by people starting to think systemically.

Some internet modelling systems are already available for learning (Anupindi *et al.* 2000, Jacobs 2000) and managers will have available in the future a distributed modelling environment for the design and dynamic simulation of supply chains, if research being currently done will deliver what is expected (Duggan 2002).

The following paragraphs present a systems thinking exercise that reviews and extends a well-known model consisting in a set of "principles" that govern e-business, as it perceived nowadays.

#### **4 The e-Business answer**

In this context one may say that SCM requires a systemic approach in order to have service as the objective of the whole logistics system, i.e., a system of processes where the key output is service and the major return is related with fidelity and retention of clients/consumers. Therefore, SC (management) should not be thought, nowadays, as a set of directional and manageable processes, one tier upstream and downstream the company, but essentially as a network of companies and processes that can be modeled and, if possible, managed, all tiers upstream and downstream the company (Carvalho e Dias, 2000)

For this reason the principles of leanness, agility and responsiveness, representing altogether periodical conjunctions of logistics systems' objectives are central to feed the entire network with the necessary energy to act, react, pro-act and, consequently, serve. The reality shows that those three principles induce energy as energy is the way to pursuit those same principles. A feedback system may be, then, observed and what appears to be an equilibrium obtained between time, cost and quality of delivery is nothing more than a consequence, or a specific *momentum* and position of the logistical system. Logistics systems are, then, permanently accumulating 'potential energy', because natural trade-offs and decisions upon the above-mentioned variables are effects, and simultaneously causes, that are able to sustain a distinctive value position in logistical terms.

Having this in mind, and the energy accumulated by each of the companies and correspondent logistics systems, it is possible to think the network approach as a sum of all value chains and energies in the various levels and positions, namely when represented and proposed by Porter (1985), upstream to downstream. Furthermore, when adequately reformulated, recreated and even extended by Hines (1993), these value chains have an inverse approach, i.e., from market to all the upstream players, only confirming, in a different perspective, the entire network accumulated energy.

Under this environment networks may be represented and expressed as being a composition of three essential elements, (1) the various companies or nodes of the network, (2) the whole set of relations, communications and transactions between companies (or the software of the network), including all the digital and the physical relations (atoms for products or components and bits for information), and (3) the whole set of structural elements, like buildings, warehouses, plants, cables (or the hardware of the network), among others (Carvalho 2001 a).

Better, under this perspective the logistical network is an approach that can be identified with the complete e-business approach, being the complete e-business approach an (inter-)entrepreneurial model, capable of deconstruct and structure businesses and groups of companies, chains and networks, and of integrating and increasing communication and digital skills with tangible capabilities, among themselves (Carvalho 2001 a). This state of entrepreneurial development will never occur, strictly, if only centred in information systems. Otherwise, potential equilibrium between atoms and bits is eliminated and information technology becomes the unique business driver while, in fact, it is, and has always been, nothing more than an enabler.

Some e-business principles have been suggested, developed and presented for success and sustainability of future business adventures. Kalakota's (2000) vision about e-business, amongst several others signed by prominent authors, is somehow partial and far from complete e-business, being just what some logisticians have just considered to be technological e-business. Nevertheless, one should intend to explore these e-business ideas and to complete them with some logistics thoughts and approaches, namely to understand what is considered a complete e-business and the consequent systems advances needed, or what is considered the real network and the interest of systems theory to understand and manage it.

Thus, the design and implementation of a new model of business, built on agility, leanness and responsiveness should be able to create a network of alliances that emerge whenever a new type of market answer is necessary and most, or preferably all of a demanding, fickle customer's rising needs can be satisfied. This new model is what is understood to be complete e-business in the present and for the future, belonging the future to this whole network of companies, processes, people, atoms and bits, under this name or under another buzzword name meanwhile given to it.

## **5 e-Business and complete e-business principles: the real network**

All the above-mentioned arguments are the basis to build a more complete e-business set of principles (complete e-business principles). The new formulation relies on the assumption that no technological movement will answer to unsolved problems when mixing atoms with bits, or when both physical and digital answers to the demanding world are needed, benefiting from the advantages offered by systemic approaches. Thus:

**Old Principle #1:** Technology, in e-business, is stated to be no longer just a support. Instead, it is argued that has become the centre of the business.

One may state that technology is not the unique driving force behind businesses, also because businesses are far from being only information-based; there is still an important physical component that should not be forgotten.

**New Principle #1:** The organisation, as well as the strategic thought emerging from it, should be based, permanently, in the following three pillars: wish (or moral strength), knowledge (or information and information systems, communications and technology) and ability to make things happen (or logistics). The need to manage and balance trade-offs is a consequence from deliberate investments in one or another of those three pillars. The investment may be more or less accentuated in any of the pillars, depending on the existing projects, economical and organisational environment and on the dynamics of change one is trying to set up, but it should never be considered that one of this pillars is the centre of the business because businesses are sustained not only by one but by three complementary and highly interrelated pillars. Thus, those three pillars are also essential to complete e-business models.

**Old Principle #2:** The business model applied to e-business cannot be the same as in a conventional business, like Bricks & Mortar; it will have to be something hybrid more like Clicks & Mortar.

Businesses should be more virtual, as virtual approaches are able to sustain agility, leanness and responsiveness. Nevertheless, they have to consider the physical component of the business. Businesses should also be more process oriented and not so vertically/internally oriented.

**New Principle #2:** The business model should be lean, responsive and agile. Thus if, and only if, Clicks and Mortar 'representation' is able to sustain process oriented approaches, within and between companies, than it can be considered to build networks of value chains and complete e-business models.

**Old Principle #3:** The inability to migrate from the current Bricks & Mortar-type model to a business model designed specially for e-business may mean the failure of a commitment to e-business.

**New Principle #3:** The inability to structure companies by processes, systems thinking, orientation for output and focus on service may mean the failure of a commitment to a complete e-business model.

**Old Principle #4:** The design of a new model of business, built on flexibility, should be able to create alliances that emerge whenever a new type of market answer is necessary.

**New Principles #4:** The design of a new model of business, such as complete e-business, built on agility, leanness and responsiveness should be able to create alliances that emerge whenever a new type of market answer is necessary and most—or preferably all the demanding, fickle customers' rising needs can be satisfied, having greater customer retention degrees in mind.

**Old Principle #5:** e-Business has the great advantage of obliging companies to listen to their customers.

**New Principle #5:** Complete e-business has the great advantage of obliging companies to listen to their clients, internally or externally, and to the clients of their clients as well as the whole way downstream through the various value chains, until final customers, since a complete e-business model has to be output focused and market oriented.

**Old Principle #6:** Technology, in e-business, should not only be used to create products but also to innovate, entertain and facilitate total experience, from the time the order is received to when it is delivered, and to additional service.

**New Principle #6:** Technology, people and logistics, as well as systems thinking of the whole organization and the network of value chains, in complete e-business models, should not only be used to create products but also to innovate, entertain and facilitate total experience, from the time the order is received up to when it is delivered, and to overcome necessities/expectations from market in order to create additional service.

**Old Principle #7:** The e-business of the future will tend to be based on business communities (or VAC's – Value Added Communities) to better meet final consumers' needs.

**New Principle #7:** Complete e-business will tend to be based on business communities, or networks of value chains, to better meet internal, first tiers and subsequent tiers of customers, including final consumers' needs.

**Old Principle #8:** The main management task will be to align business strategies, processes and applications quickly, efficiently and on the first try.

**New Principle #8:** The main management task will be to 'align' business strategies, processes, applications, but also people, quickly, efficiently and on the first try, having in consideration the ideas of empowerment as well as processes managed and 'owned' by human capital.

**Old Principle #9:** Finally, and among others, on the strength of the original "Take an order, give an accurate promise date, manufacture the right goods, allocate properly, ship efficiently, and do all of this in a cost-efficient manner while maintaining a minimal finished goods inventory. Whatever bells and whistles you add to the basic foundation are wonderful, but if you can't do the simple stuff, there's no way you can support the newer applications or leading-edge technology" (Kalakota, 2000).

**New Principle #9:** Take an order, give an accurate promise date, manufacture the right goods, allocate properly, ship efficiently, and do all of this in a cost-efficient manner while maintaining a minimal finished goods inventory. Whatever bells and whistles you add to the basic foundation are wonderful, but if you can't do the **hardest stuff and dominate business**



**processes**, there's no way you can support the newer applications, the human capital or the logistical dimensions of the business.

In fact, nothing of this is really new. These whole principles have been suggested, if not explicitly proposed, both by systems theory and by logistical ideas and developments. Combining systems development with logistical management one should find, principle by principle, that neither e-business principles nor even these apparently new complete e-business principles are, actually, original.

To sustain the need to add a systemic approach to SCM or network management, and to demystify some e-business principles, one should have to appeal to some empirical evidence that will support the necessary conclusions. Indeed, the unique possible way is to emphasize something more integrated and complete than e-business *tout court* that, for the purpose of this paper and other publications (Carvalho, 2001 a) has been chosen to figure as complete e-business.

During the period between May and July 2001, a survey was conducted with the associates of ECR Portuguese Forum: 56 companies at that time. These companies were considered the most expressive companies operating in the Portuguese arena in the fast moving consumer goods spectrum and they have shown a most important role in the improvement of service/time oriented markets. The companies operated in the following business areas: food, drugstore, para-pharmaceuticals, and hygiene and cleaning, essentially (Carvalho 2001 b, c).

Companies have been surveyed at the level of producers, retailers and wholesalers. The international leaders, with the best practices, have also been included, as long as they have a measurable expression in the Portuguese territory. From a universe of 56 companies, or the universe that has received the formal questionnaire, the results obtained indicate a sum of 39 valid answers: 17 from producers, 14 from retailers and 8 from wholesalers.

Regarding the universe selected for research the obtained sample is truly representative of the ECR Portuguese Forum, since companies were considered to meet the criteria imposed, that were turnover representation, geographical coverage and brand identity notoriety. Some major results directly related with this paper subject are condensed in Table 1.

## **6 Conclusion**

In comparing e-business propositions with the ideas developed by systems' theory and logistical management approaches, analysed principle by principle, we have concluded that e-business approaches are more powerful when accompanied by other thoughts and complemented with some more structured theories. For this reason, if we want e-business to be something useful in the future we have to rename it, or even to give new identity and new contents to the concept, namely using the expression "complete e-business".

Therefore, during the paper creation we have found some pretty interesting aspects, some coincidences and/or some duplications, which could be useful to demystify technological e-business and to create the necessary equilibrium between the whole set of forces and drivers within and between corporations.

Knowing systems developments as well as logistical management concepts it is somehow undeniable that e-business advances have not shown, till now, neither an outstanding structure nor a great creativity or genuine corpus for being considered a new route in terms of management science.

To complete this approach and to sustain conclusions with some empirical evidence we have included a few important results from a survey that illustrates not only the relative value of e-business propositions over time but, also, the criticality of human factors and the importance

of logistics knowledge. In this context, one may point out that respondents foresee, in a majority, that the highest e-business potential should be postponed to the near future but not so evidently to a medium term period (compare answers from 2-5 years with those from 5-10 years). This may suggest that e-business is nothing more than a fancy buzzword often applied to a reality that does not exist, having high probability of being substituted for another buzzword, its correspondent ideas and, somehow, an imaginative and merely hypothetical reality related with it.

Table 1. Some major results from the survey for, and with, the ECR Portuguese Forum Companies (Producers, Retailers and Wholesalers)

<b>Positive Answers Depending on Time</b>	<b>Today</b>			<b>2-5 Years From Now</b>			<b>5-10 Years From Now</b>			<b>Likert Scale Results (2-5 Years From Now)</b>
<b>Type of Company/ /Evaluations</b>	<b>P</b>	<b>R</b>	<b>W</b>	<b>P</b>	<b>R</b>	<b>W</b>	<b>P</b>	<b>R</b>	<b>W</b>	<b>All Answers</b>
Evaluation of e-Business potential	11%	21%	0%	79%	86%	75%	74%	86%	63%	3,84
Evaluation of human capital importance & correspondent needs for e-business approaches	16%	29%	0%	53%	43%	50%	NA	NA	NA	4,00
Evaluation of e-commerce offers (today to 2-5 years)	21%	21%	13%	63%	71%	38%	NA	NA	NA	3,72
Evaluation of professional information interests related with SCM and network management	79%	79%	38%	89%	93%	38%	100%	100%	50%	3,70
Note 1: P – Producers; R – Retailers and W – Wholesalers; Note 2: Likert Scale Medium points indicated, varying from 1 – minimum to 5 – maximum and applied to answers related with 2–5 years from now; Note 3: Answers in this table do not relate to any specific, exemplified or referenced e-business (if any) model; Note 4: Percentages correspond to positive evaluations of each topic from companies; Note 5: NA – not available.										

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