

The Integration of the Supply Chain: Rationalization vs. Synergy

Bojan Rosi

University of Maribor, Faculty of Logistics Celje, Slovenia

Vojko Potocan

University of Maribor, Faculty of Logistics Celje, Slovenia

Abstract

Management can improve results of enterprises, above all, by an innovative re-allocation of available resources and a synergetic integration of their working. A significant factor of the quality of management in enterprises such as business systems (BSs) is their restructuring by an innovative integration aimed at achieving better business results through synergetic effects. BSs can improve cooperation between their parts or their cooperation in broader integrations. Our research is focused on the supply chain (SC) as an instance of a possible integration of logistics in or between BSs and on the economic reasonableness of their participation in an SC, aiming to take advantages of value chains. In practice, each BS can create its own SC or can participate in broader SCs. For that reason, the economics of the participation of a BS's parts in an SC, and BSs as parts in broader SCs, are considered. Additionally, the business processes of an SC are examined as the cybernetic entities of the basic, management, and information partial systems of the participating BSs. To create an integration process, the concept of Business Re-Engineering, which enables the simultaneous realization of both rationalization and synergetic effects and their direct support to the creation and exploitation of a competitive advantage of value chains in an SC, is applied.

Keywords

Management; quality of management; innovative restructuring; integration; synergetic effect; rationalization effect; business re-engineering; value chain.

Introduction

The restricted availability of resources and severe conditions of operation determine the opportunities of enterprises as business systems (BSs) to achieve their competitive business results (Harman & Porter, 1997; Fly & Stoner, 2000; Jennings, 2005; Daft, 2009). Numerous management solutions have emerged in recent years as a response to competitive pressures calling for an improvement of operations which BSs can provide the required business success through (Wren, 2004; Mullins, 2007). Despite the relevance of the improvement of operations, there are limited research pieces of evidence about innovative management solutions aimed at holistically considering BSs' management (Wren, 2004; Jennings, 2005; Quick & Nelson, 2009) and corresponding management concepts behind them (Daft, 2009; Certo & Certo, 2011).

A significant improvement of a BS's results is possible to make when the business operations of such a BS are holistically defined – i.e. defined from essential aspects, their relations and synergies (Galbraith, 2002; Mulej, 2007; Quick & Nelson, 2009). Management's innovative measures of the re-allocation of available resources of BSs are especially important – as a creative destruction of the current business factors and structures, and their replacement by more innovative ones, and a synergetic integration of BSs' working – as possible solutions for the optimization of the existing capacities (Potocan & Kuralt, 2007; Potocan & Nedelko, 2014). When linking the re-allocation of available resources of BSs to a synergetic integration of BSs, we are focusing our research on the restructuring of the existing operating of BSs by an innovative management of integration aimed to lead to better business results through synergetic effects.

BSs can improve cooperation in the frame of the internal or the external environment (Drucker, 1990; Fly & Stoner, 2000; Galbraith, 2002; Jennings, 2005). Consequently, there are close links and synergetic inter-dependences between BSs and their environment that lead to the creation of various kinds and types of integrations between BSs. In the current business environment, a very promising solution for the improvement of a BS's economic results is derived from the supply chain (SC) as a system (i.e. a complex network) of organizations, people, activities, information and resources involved in moving products or services from suppliers to customers (Bowersox et al., 2012; Gibson et al., 2005). In practice, on the base of its interest and possibilities, on the one hand, and demands of the environment, on the other, each BS can choose appropriate ways and forms of its participation in an SC from the creation of its own SC to participation in broader supply chains (SCs).

Previously conducted management studies of SCs have led to the growing interest of a BS in referring to various methodological, content- and circumstances-based solutions concerning economic results of SCs (Mentzel et al., 2001; Lambert et al., 1997; Chopra & Meindl, 2015). Empirical studies, though, reported contradictory results regarding: (a) the possible goals, approaches and characteristics of the several forms of SCs; (b) the possibility of the integration of an SC in or between BSs and (c) the economic reasonableness of BSs' participation in SCs, aiming to take advantages of value chains (Stevens, 1989; Lambert et al., 1998; Goold & Campbell, 1998; Stevenson & Spring, 2007).

This article addresses controversies in considering the innovative management of SCs' integration, which characterizes the systemic approach and process thinking, which both enable goal-oriented operating and an adequate consideration of the majority of factors important for the simultaneous realization of both the rationalization and synergetic effects of SC and their direct impact on the creation and exploitation of the competitive advantage of value chains in SC (Stevens, 1989; Lambert et al., 1997; Chopra & Meindl, 2015).

Modern concepts of the systems theory, including but not limiting themselves to the consideration of the General Systems Theory, the Soft Systems Methodology and the Fuzzy concept, enable a holistic approach to the understanding, definition and implementation of business operations (Francois, 2004; Mullins, 2007; Daft, 2009;

Certo & Certo, 2011). However, within the traditional-structural concept – rather than the process one – of the business operation mode, not all possibilities aimed at by modern BSs can be utilized (Galbraith, 2002; Hammer, 2004; Daft et al., 2012). The advantages of the systems approach within the framework of the process concept of a BS's operations can much better be applied (Potocan, Mulej, & Kajzer., 2005; Mulej, 2007; Potocan & Nedelko, 2014). There are two areas in which the process approach is primarily important for the quality of management: (a) the cognition of the primary dependence of a BS's processes and their structures and (b) the holistic monitoring of events in the time and space dynamics.

The systems approach also enables an examination of business processes as a cybernetic entity of the basic, management, and information (partial) systems of the considered BSs and the corresponding SC, and provides the basis for the establishment and judgment of integrability (Potocan et al., 2005; Potocan & Mulej, 2009; Potocan and Nedelko, 2014). For the purpose of the rationalization of a BS's SC, such a BS can initially use each of above mentioned (partial) processes as the starting points. On the other hand, the realization of synergetic effects is only possible if one bases integration in the basic process, which produces the final business effects, i.e. products and/or services in its integration with the management and information processes. Further on, it is necessary that the corresponding managerial and information processes should be built for the basic process to be optimal.

The management of BSs and their corresponding SCs in which such BSs cooperate is increasingly oriented towards the achievement of such an optimum in which the economic goals remain the fundamental, but not necessarily sufficient, precondition of the desired quality of the BS's operations (Jennings, 2005; Mullins, 2007; Potocan & Mulej, 2009). Additionally, either directly or indirectly, ecological, ethical and many other BS's goal-related factors also determine economic results and typically create preconditions for a potential direct attainment of the BS's basic economic goals (Drucker, 1990; Wren, 2004; Buchanan & Huczynski, 2010).

At the same time, BSs can use various concepts for the determination of the adequacy of their economic results; such concepts vary from those traditionally oriented towards the maximization of a profit to those with a present orientation towards optimization within the framework of the

entire value chain (Drucker, 1990; Harman & Porter, 1997; Certo & Certo, 2011). In the current business environment, Porter's idea (Porter, 1985) about the use of the value chain concept for the recognition and determination of contributions for all parts of the considered entity and the optimization of the results of the whole of the considered SCs' entities can be seen in the forefront. This research or ours considers the economics of participation with respect to a BS's parts in an SC, when the BS creates its own SC, and BSs as parts of broader SCs.

To make the integration process work well, various methods and techniques enabling the realization of rationalization, a synergy, or a simultaneous realization of both rationalization and a synergy; a competitive advantage of a value chain in an SC is thus created and exploited (Porter, 1987; Goold & Campbell, 1998; Drucker, 1990; Palmer, et. al., 2009).

From the theoretical viewpoint, this study contributes to the existing literature, by presenting a more holistic consideration of: (a) the innovative re-allocation of available resources in or between BSs, (b) the innovative integration of the SC, (c) the economic reasonableness for BSs' participation in SCs, (d) possibilities of achieving advantages of value chains in the SC, (e) an achievement of better business results in SCs through rationalization and synergetic effects, and (f) the implementation of Business Re-Engineering for the purpose of the integration of the SC, which enables the realization of both rationalization and synergetic effects and the exploitation of the competitive advantage of value chains in the SC.

1. Literature Review

Numerous management ideas have emerged in recent years in response to the competitive pressures calling for enterprises' improved work and behavior (Daft, 2009; Buchanan & Huczynski, 2010; Certo & Certo, 2011). The cornerstone of our research is the management theory, (Wren, 2004; Mullins, 2007; Daft, 2009) according to which, above all, the operations of BSs and possible results of BSs' operating depends on an innovative re-allocation of available resources and the synergetic integration of their work (Potocan et al., 2005; Potocan & Mulej, 2009). This framework has been applied by several authors in order to predict BSs' intentions and behavior both within and outside BSs (Drucker, 1990; Hammer, 2004; Quick & Nelson, 2009). In our study, we have referred to the cognitions obtained from the management, organi-

zation and systems theories as a theoretical bridge between the results of the operating of each BS and the inclusion of individual BSs in broader integrations (Potocan et al., 2005; Potocan & Nedelko, 2014).

Following Whetten et al. (2009) recommendations on how to properly apply theories from different disciplines, we have modified the selected theories so as to make them fit the specific objectives of the present studies. First, under the objective norms' components, we have assessed BSs' perceptions of their economics expectations, which is a significant driver for the achievement of better business results through the implementation of synergetic effects (Ansoff, 1965; Porter, 1996; Goold & Campbell, 1998; Potocan & Mulej, 2009). We have also acknowledged that the global business environment enables us to exceed the barriers to and constrains of business integrations between BSs (Jennings, 2005; Certo & Certo, 2011). Second, we have extended the framework for the consideration of business integrations to incorporate systems and cybernetics construct in relations to the implementation of synergetic integrations. It is our intention to explore the manner in which each BS can participate in different integrations, and how our using different types of integrations can influence the operating and results of new integrations (Beer, 1985; Porter, 1987; Wren, 2004). Third, we have applied the systems theory and business cybernetics (see e. g. Ashby, 1956; Bertalanffy, 1968; Foerster, 1974; Rose, 1974; Mulej, 2007), which enabled us to use a more objective measurement of the contributions for each part of a new integration and the results of the whole of such a new integration (Wiener, 1956; Bertalanffy, 1968; Beer, 1985; Potocan et al., 2005; Mulej, 2007; Daft, 2009).

Management reported on several approaches for the restructuring of BSs by conducting an innovative integration aimed at achieving better business results (Porter, 1996; Galbraith, 2002; Wren, 2004). In an attempt to capture the interdisciplinary character of integration, we have adopted a holistic approach that views integration as the sum of a broader array of initiatives tied to planning, operating and functioning at the organizational level (Potocan et al., 2005; Mulej, 2007). We have extended the previous research into the advantages of linking operations in integration to the concept of the values chain so as to argue that different parts of integration, although distinct, are mutually supportive (Grant, 1991; Blanchard, 2004; Certo & Certo, 2011). Furthermore, when some parts of a functional integration are supplemented by new parts,

these new, different parts are likely to reinforce each other. We have, therefore, drawn on the complementarity theory (Milgrom, & Robersts, 1995) to argue that integration initiatives targeting different business areas produce synergistic effects and complete each other when put together. In addition, we have extended the previous research into the systems understanding a synergy as a possible way to implement a positive synergy in business integrations (Foerster, 1974; Beer, 1985; Goold & Campbell, 1998; Mentzer et al., 2001).

Previous studies of synergy in the management and business literature have been focused on the consideration of the forms of the appearance synergy and the reasons for their arising (Panrose, 1959; Ansoff, 1965; Porter, 1985). For example, Panrose (1959) considered two forms of synergy, Ansoff (1965, p. 80) defined the operating, investment and managerial synergies, whereas Porter (1985, p.328) provides us with broader explanations for the possible origins of the business synergy: “sharing has the potential to reduce cost if the cost of value activities is driven by economics of scale, learning or the pattern of capacity utilization”.

The latest management studies focus on the achievement of synergy in the integration of the individual areas or viewpoints of BSs – e.g. marketing, costs, finance, taxes, management etc. (Mullins, 2007; Daft, 2009; Daft, Murphy, & Willmott, 2012). Within that framework, several authors argue that synergy presents the pre-conditions necessary for the achievement of efficiency and effectiveness in business integrations (Goold & Campbell, 1998; Grant, 1991; Potocan & Mulej, 2009).

Management studies teach us that the holistic and innovative operating of purchasing operations and physical distribution also plays an important role in business (Nigel, 1996; Simchi-Levi, Kaminsky, & Simchi-Levi, E, 2007; Hugos, 2011; Chopra & Meindl, 2015). A possible level of suitability when assuring the needs and demands of end-users is the subject-matter of discussion in several studies (Lambert, 2004; Lambert, Cooper, & Pagh, 1998; Stevenson & Spring, 2007). The use of logistic and material management in BSs enables us to partly improve work rather than “optimize” the whole of the process of the production of products and/or services. To deal with the whole of the supply process, many different integrated concepts of managing across the traditional-functional areas of purchasing operations and physical distribution have been developed,

such as materials management, merchandising, logistic, and the supply chain (Hugos, 2011; Bow-ersox, Closs, & Cooper, 2012).

While the significance of integrated concepts in management across the logistic functional areas has been noted (Lambert, 2004; Lambert, Cooper, & Pagh, 1997; Mentzer et al., 2001), the framework for an innovative integration of the SC is still not clearly understood (Lambert et al., 1998; Gibson, Mentzer, & Cook, 2005; Stevenson & Spring, 2007). To a large extent, the literature suggests an innovative restructuring of the SC’s participants’ business operations, emphasizing the importance of the optimization of their work (Harman & Porter, 1997; Galbraith, 2002; Wren, 2004; Daft, 2009). For instance, Gibson et al. (2005) suggest that the SC’s aims should be set in such a way as to enable the rationalization of logistic activities; Mentzer et al. (2001) report on the results of the different types and forms of SCs, while Stevens (1989) discusses the influences of the SCM on the optimization of SCs.

On the other hand, the current interdisciplinary studies of the SC suggest that functional integration is what enables the simultaneous realization of rationalization and synergetic effects and their direct support to the creation and exploitation of the competitive advantage of value chains in the SC (Stevenson & Spring, 2007; Chopra & Meindl, 2015). Specifically, the value chain theory views the work of the SC as a result of the operations conducted by its parts, tied together through a causal chain (Porter, 1985; Goold & Campbell, 1998). The cornerstones of a values chain are contributions of participants in the creation of the new values of the final results of whole entity. We expect that individual participants in the SC will differently affect the SC. Additionally, the results of the participation of individual parts in the SC depend on the characteristics of the considered SC.

The above-mentioned theoretical and research findings with respect to the use of an innovative restructuring of BSs (e.g. Galbraith, 2002; Wren, 2004; Mulins, 2007), the integration of the SC (e.g. Lambert, 2004; Chopra & Meindl, 2015) and the basis for the integration of the SC (Lambert et al., 1998; Stevenson & Spring, 2007) suggest the following research questions:

H 1: How to select potential partners for the integration of a desired SC?

H 2: How to realize rationalization and synergetic effects in an SC?

H 2: What is the main criterion for the integrity of the parts of an SC?

2. Management of Logistics

2.1. The Supply Chain

In the modern environment, BSs can ensure their existence and long-term development by holistically satisfying the needs and demands of their end-customers (Lambert et al., 1998; Metzger et al., 2001; Gibson et al., 2005). Producers can be competitive on the market if they offer a suitable: price, quality, range, uniqueness, and contribution to sustainable development/social responsibility as judged by customers.

Therefore, producers are confronted with a constant dilemma of how to re-form their work in order to reach the desired target results (Fly, & Stoner, 2000; Potocan & Mulej, 2009). The role of the holistic and innovative forming and performing of their purchasing operations and physical distribution are in the forefront of modern business (Nigel, 1996; Lambert et al., 1997; Hugos, 2011). Several authors define a possible level of suitability when meeting the needs and demands of their end-users. The use of organizational logistic and material management enables just a partial improvement of work rather than the “needed optimization” of the whole of the process of the production of products and/or services. To deal with the whole supply process, four main integrated concepts of managing across the traditional functional areas of purchasing operations and physical distribution have been developed – i.e. material management, merchandising, logistics, and the supply chain (Blanchard, 2006; Bowersox et al., 2012). Each concept uses different ways to link and integrate participants involved in the flow of materials and services (Pohlman, Gardiner, & Heffes, 2000; Slack, Chambers, Johnson, & Betts, 2006; Hugos, 2011; Chopra & Meindl, 2015).

The materials management originated from the purchasing functions implying the importance of integrating the material flow in its supporting functions both inside and outside a BS in order to include the immediate customer. It includes the functions of purchasing, expediting, inventory management, stores management, production planning and control and physical distribution management. At the time of its inception in the 1970s, material management was seen as the reducing of “total costs associated with the acquisition and management of materials”. Merchandising presumes that in retail operations the purchasing task is frequently combined with the sales and physical distribution tasks into the role termed

merchandising. Merchandising is typically responsible for organizing sales intended for retail customers, the layout of the shop floor, inventory management and purchasing. The logistics concept supported the activities related to the management of the total flow of finished goods downstream from the plant to the customer. Here, the term logistic is used as the analogous term to what was previously referred to as “physical distribution management”. However, logistic has more recently been extended so as to include more of the total flow of materials and information. The supply chain includes the entire SC from the supply of a raw material, via manufacturing, assembly and distribution to the end-customer. When the content of the SC is concerned, it includes the strategic and long-term consideration of the whole of the logistic viewpoint of business operations as well as the shorter-term control of the flow through the SC.

Since the early to mid-1990s, there has been a growing body of the literature focusing on the SC and supply chain management (SCM); as a result, the literature has provided us with several definitions of both concepts (Pohlman et al., 2000; Handfield & Nichols, 2002; Blanchard, 2006; Slack et al., 2006).

Theory reported on different definitions of the SC, which was supposed to mean that the SC “encompasses all activities associated with the flow and transformation of goods from the raw material stage (extraction), through the entire process to the end user, including the associated information flow” (Blanchard, 2006, p. 26). In reality, there are several types of SCs whose several key points should be noted. . SCM presents “the systematic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses in the SC, for the purpose of improving the long-term performance of the individual companies and the SC as a whole” (Lambert et al., 1998; see also Slack et al., 2006). Thus, the present management concept covers the planning, leading, organizing and controlling of the SC.

Successful SCM requires that companies should accept a BS-to-BS viewpoint, which can cause a BS to accept the practice and adopt the behavior rather not traditionally associated with buyer-seller interactions. Moreover, successful SCM requires that companies should apply the systems approach across all BSs in the SC. When applied to SCs, the systems approach suggests that BSs must recognize the interdependence of

the major functional areas within, across and between BSs. In turn, the goals and objectives of individual SC's participants should be compatible with the goals and objectives of other participants in the SC.

SCM also importantly changes relations between BSs. Conventional wisdom suggests that, in the twenty-first century, BS-versus-BS competition will be superseded by Supply-Versus-Supply-Chain Competition. While this may occur in a few situations, such competition may not be practical in many instances because of common or overlapping suppliers or the lack of a central control point, among other reasons. There is rather a more realistic perspective that individual members of an SC will compete based on the relevant capabilities of their supply network, with a particular emphasis on immediately adjacent suppliers or customers.

Modern logistic and management researches reported on the existence of several kinds, types and forms of SCs and the corresponding relationships between the parts of SCs and between the parts and the whole of SCs (Lambert et al., 1998; Stevenson & Spring, 2007; Hugos, 2011). In our research, we have examined the relationships in terms of the flows between the operations of SCs (Mentzer et al., 2001, Gibson et al., 2005; Slack et al., 2006; Bowersox et al., 2012). These flows may include transformed resources, such as materials, or transforming resources, such as people or equipment. The exact nature of the relationship between the different linkages within the SC can be viewed on a continuum, which goes from highly-integrated commitment, at one extreme, all through to temporary and short-term trading commitment, at the other.

Management can importantly improve BSs' results by conducting an innovative re-allocation of available resources and a synergetic integration of their working. In both cases, BSs must re-think the adequacy of their roles and importance in SCs and possibilities of improving their working inside SCs.

2.2. Supply Chain Integration

SC management is oriented towards all crucial integrating operations across all the facets of business flows within and across BSs in order to obtain competitive advantages (Lambert, 2004; Bowersox et al., 2012). Researches have been focused on the integrated SC-related competences and skills needed to enhance the customer value

(Handfield & Nichols, 2002; Slack et al., 2006; Stevenson & Spring, 2007).

Less developed are relationships among the parts of the SC and among the parts of the SC and the whole of the SC and the possible optimization of the whole of the SC working (Stevens, 1989; Simchi-Levi et al., 2007; Potocan & Mulej, 2009). Previous researches reported on the conceptualization of relations in operational processes (Slack et al., 2006; Bowersox et al., 2012), business interrelationships among the strategy, the structure, the process and performance (Harman & Porter, 1997; Galbraith, 2002; Daft, 2009), relationships among the logistic strategy, the design, and performance (Rushton, Oxley, & Croucher, 2001; Lambert, 2004), and the relational flow in the considered integrations (Bowersox et al., 2012).

Some researchers empirically tested the elements of business integrations including the SC and focused on (see Simchi-Levi et al., 2007; Hugos, 2011) the influence of the integration factors on a BS's performance (Slack et al., 2006); the relationship between the strategy, the organizational design and outputs (Gibson et al., 2005); and the influence of the integration factors on the selected viewpoint of performance as financial performance (Lambert, 2004; Lambert et al., 1997).

Other researchers reported on the consideration of the selected business viewpoint or areas of business integration and SCs and created the corresponding classifications of synergies (Hugos, 2011; Bowersox et al., 2012). Economics, management and technical viewpoints are often in the forefront in the researches into business integration (Porter, 1987; Goold & Campbell, 1998). Researchers also reported on the integration of marketing, costs, financial, taxes and general management (Wren, 2004; Jennings, 2005; Daft et al., 2012). Integrations originating from the use of the individually selected viewpoint or area can help a SC's participants to achieve a certain level of the optimization of operations and results. Contently, their approaches enable a partial rationalization of the SC operating and a partial improvement of the SC results, primarily in the parts of SC.

More promising is the idea about functional integrations as the main reason and cause for business integrations (Stevens, 1989; Gold & Campbell, 1998; Lambert et al., 1998). The functional integration of the SC provides the conditions necessary for a possible achievement of desired synergetic effects. Some recent studies have

also made a link between functional integration and the concept of the value chain, which enables very objective evaluations in judging the contributions of each part of the SC and the results of the whole of the SC; consequently, it presents possible solutions to a simultaneous improvement of the operation and results of the parts of the SC and the whole of the SC through synergetic effects.

The realization of actual synergetic effects is additionally influenced by the factors determined at a political or a strategic level in the presenting the preconditions or frameworks for the SC integration (Slack et al. 2006; Chopra & Meindl, 2015). In the literature, authors often mentioned the expected purpose, goals, extent, level, centralization, management etc. of the SC and the expected way of the inclusion and planning the role of individual participants of the SC. A further investigation into these factors exceeds the framework of our research.

Researchers into the functional synergy devote less attention to the integrability of the SC's part and the appropriate selections of potential partners for integration in a desired SC. Therefore, this research of ours develops itself taking into consideration the synergy and its use in the creation and evaluation of the operation and results of the SC.

3. Synergy as the Base for Business Integration

3.1. How to understand synergy?

The term synergy comes from the ancient Greek word *synergia*, derived from the word *synergos*, which means "working together" (Ayto, 1994). The more recent understanding of *synergy* originated from physiology as early as in the mid-19th century (e.g. see Mazel, 1896; Ward, 1909; etc.); it implied the creation of a whole greater than the simple sum of its parts (Corning, 1983; Corning, 2003; Blanchard, 2004). In management and the business literature, authors used the term *synergy* mainly for the purpose of a discussion about the effect arising between two or more different parts, agents, factors producing some results or additional benefits greater than the sum of their individual effects – for different definitions of synergy, see Ansoff (1965), Porter (1985), Campbell, Gould, & Alexander (1994), Gold & Campbell (1998), Mullins (2007), and Buchanan & Huczynski (2010).

In the recent literature on management, the consideration of synergy is importantly related to the composition of new entities for BSs' working (Mullins, 2007; Daft, 2009; Certo & Certo, 2011). There are two approaches possible us refer to: the compositions of the existing parts – in the systems of the first order, or making a new entity as the systems of the second order. The composition of the first-order systems are used in the second-order system on the basis of the relations existing between the initial systems and their (shared) environment. The composition of the first-order system can also be used in the second-order system also derived from the existing relations, but rather focusing on the creation of new relations, hence, of an entity with new attributes not only derived from the attributes of the composing parts.

The qualitative jump attained by composition, i.e. the difference between old qualities and new ones, is called a synergy. Regarding the possible results of business integration between BSs, there are three types of synergies possible to define, namely: the positive, the negative or the neutral synergy – for more details about each type of *synergy*, see Ansoff (1965), Porter (1985), and Gold & Campbell (1998). These insights allow us to suppose that the composition process only makes sense only if it provides for positive synergetic effects such as an improved efficiency in operations, a greater exploitation of opportunities and an improved utilization of resources. Integrations causing negative synergetic effects are problematic, such as a reduced efficiency of operations, the underutilization of resources and disequilibrium with the external environment. Integrations are also unsuitable if they provide for no synergetic effects, such as neutral synergies. In such conditions, efforts to achieve a composition only produce additional costs, thus diminishing the effectiveness and efficiency of potential partners.

Another important viewpoint of dealing with synergy tackles the direction of the synergy effort that can be directed either vertically or horizontally (Drucker, 1990; Harman & Porter, 1997; Wren, 2004; Potocan et al., 2005). Starting from the interdependency of the BS's parts of different BSs and the corresponding SC/SCs, there are three directions in the formation of synergies possible to define. The vertical synergies are generated between the processes and the systems (i.e. complex round-off units) whose basic processes provide for various/different phases of the business process and generate a sensemaking value chain. In this case, the synergy generating efforts

are focused on increasing the parts of the entire generated value and on optimizing partner links. The horizontal synergies are generated in the composition of the processes and systems whose basic processes compose the same phase of the business process and generate a sensemaking entity. The synergy generating efforts are focused on improving the shared position of the participating BSs by exchanging or uniting resources important for competitiveness. Synergies can also result from composing the business processes and systems whose basic processes are simultaneously interdependent and parallel and generate a sense-making entity; therefore, one tries to realize both the 'vertical' and the 'horizontal' effects.

When defining synergies, authors also refer to various additional criteria (Ansoff, 1965; Porter, 1985; Gold & Campbell, 1998). Thus, from the viewpoint of time, synergies can be either permanent or temporary. The permanent ones include the results of permanent integrations. The temporary ones include the results tackling a limited time period with the aim to cover the shared execution of single tasks or jobs. The *area* aspect of synergetic working also matters: the point is at the level of the openness of such integration to the internal or external environment. Synergies can be goal-oriented to the basic, information and managerial partial process; they also have different synergy potentials. The possibility to attain synergies also essentially depends on the phase of the lifecycle in which single integration partners are or the nature of the integration system (i.e. complex entity). One's being familiar with the levels of synergy also matters they can have an impact inside a single part of an integration, between its parts or between the integration and its environment, or the environment.

In addition to the foregoing, a possibility of attaining synergetic effects in a new integration – from the viewpoints of its single parts or the entire integration – is impacted by the several factors linked to the purpose and objectives determining the form of a future integration, the level of its centralization, its foreseen governance and ways of being managed, relations between its participants and the manner of the foreseen participation of single participants in the integration. These topics, though, reach beyond our contribution here (Potocan et al., 2005; Potocan & Mulej, 2009).

The fact that to conceptualize or assess the synergy on the basis of one single out of the given criteria makes no sense must especially be stressed at this point; the quality, the quantity, the

time and room make an integral entity, hence sharing their impact on the attainment of synergies.

3.2. The Synergetic Concept and Integration Processes

Our attention focuses on the functional, i.e. production relations between the parts and the entire entity at two different levels, namely at the level of the integration of the individual parts of a BS into an entire BS in the corresponding SC or the integration of the individual BS into the broader integrations of BSs in the corresponding SCs – for more details about the starting points and the methods for research, see Potocan et al. (2005), Potocan & Kuralt (2007), and Potocan & Mulej (2009). Within the issue of the integration of SCs, there is a problem of the linking of: (a) the given part to the other parts of the considered entity, enabling the given part to achieve the results that otherwise cannot be achieved by an individual part alone. The difference is made by a synergy, of course.

According to our experience and investigations, the synergetic results of each of the BSs' or SCs' operations can be best achieved by applying the systems approach. The latter, namely, enables the integration of the selected units into a new entity on the basis of the suitable restructuring of the integration partners.

Linking is supposed to form from parts an entity qualitatively different from its components: such a new entity must, therefore, possess characteristics which can (only) be derived from the relations of its components. This entity can best be achieved by a composition based on such new relations. The impact of the composition can also be reverse: the formation of a new entity changes the quality of its parts, too; they gain new characteristics arising from their new interdependences. This, of course, means that the precondition for achieving a successful composition is also its opposite, i.e. decomposition. Because of this, the process of the composition as well as the one of the decomposition of an entity is a two-way process as well.

The integration process of the BS/SC is a specific example of a composition the purpose of which is also to make a quality "jump", i.e. the synergetic effect.

Suppose that there are the "m" considered systems of the first order $S_i^{(1)}$ that achieve the effects of $e_i^{(1)}$. Their set $S^{(1)}$, which is a set of potential integration partners, can be expressed as:

$$S^{(1)} = \{(S_i^{(1)}, e_i^{(1)}); i = 1, 2, \dots, m\} \quad (1)$$

By various integration processes, one can compose the “n” various systems of the second order $S_j^{(2)}$ with the corresponding effects $e_j^{(2)}$, i.e. a set of possible integrated systems $S^{(2)}$:

$$S^{(2)} = \{(S_j^{(2)}, e_j^{(2)}); j = 1, 2, \dots, n\} \quad (2)$$

It appears that all the integrations $S_j^{(2)}$, which show an increased effect, are acceptable. Therefore, the necessary precondition for integrability is as follows:

$$e_j^{(2)} - \sum_{i=1}^m e_i^{(1)} > 0 \quad (3)$$

The question is whether the precondition (3) is also a sufficient precondition for integrability. Namely, the analysis shows that the above-mentioned quantity “jump” (3) consists of two parts different in their contents, i.e. of:

the rationalization effect $r_i^{(1)}$, which makes the difference between the optimal effect ${}_o e_i^{(1)}$, which is the local optimum of the initial system of the first order $S_i^{(1)}$, and its actual affect $e_i^{(1)}$

$$r_i^{(1)} = {}_o e_i^{(1)} - e_i^{(1)} \quad (4)$$

and

the synergetic effect $s_j^{(1 \rightarrow 2)}$, which is the difference between the effect $e_j^{(2)}$ of the integrated system of the second order $S_j^{(2)}$ and the sum of the optimal effects ${}_o e_i^{(1)}$ of the initial systems of the first order $S_i^{(1)}$, i.e. the sum of the local optimums of prospective integration partners:

$$s_j^{(1 \rightarrow 2)} = e_j^{(2)} - \sum_{i=1}^m {}_o e_i^{(1)} \quad (5)$$

It is obvious that the rationalization effects (4) cannot be attributed to the integrations, as they can be attained at the initial systemic level, without integration. Due to this fact, they must be excluded from the criteria for the judgement of integrability, which can only be judged on the grounds of the synergetic effects (5), i.e. on the quality “jump”, resulting from the new relationships between the partners and their environment. The synergetic effect is, therefore, a sufficient precondition for integrability.

Only the possible integrations of the set $S^{(2)}$, which show positive synergetic effects, will be acceptable. They can be expressed as the set of $S_*^{(2)}$:

$$S_*^{(2)} = \{(S_k^{(2)}, s_k^{(1 \rightarrow 2)}); S_k^{(2)} \in S^{(2)} \wedge s_k^{(1 \rightarrow 2)} > 0\} \quad (6)$$

The criterion to select the optimal integration $S_o^{(2)}$ in the set $S_*^{(2)}$ is the optimal synergetic effect:

$$s_o^{(1 \rightarrow 2)} = \left[{}_o e_k^{(2)} - \sum_{i=1}^m {}_o e_i^{(1)} \right] \quad (7)$$

which is the maximum difference between the global optimum ${}_o e_k^{(2)}$ of the integrated system $S_k^{(2)}$ and the sum of the optimums of ${}_o e_i^{(1)}$ of the initial systems $S_i^{(1)}$.

Not only can the synergetic effect be used for an evaluation of integrability and a selection of the optimal integration of the given integration partners, but it can also be used for a selection of potential integration partners. In this case, of course, the integration problem is an open one. Moreover, the judgement of integrability is not limited to a search for the optimal institutional form of integrations, but also includes every involvement of the parts in their value chains.

In the context of a synergy, the synergetic effect and integrability, the basic problem is the content concerning the measure of the quality of the systems, which is here expressed by the effect “e”. As in modern post-industrial conditions each BS must be relatively open at any integrational level, this measure must include, apart from internal, external knowledge as well, and apart from direct, indirect effects as well.

A synergy is aimed at by organizational structuring. Both the literature and empirical evidence, however, have demonstrated that structuring is insufficient if not process-based (Galbraith, 2002; Mullins, 2007; Buchanan & Huczynski, 2010).

3.3. The Process Consideration of Business Systems’ Working

The process concept is an alternative to the structure concept (Wren, 2004; Mullins, 2007; Daft, 2009; Certo & Certo, 2011). “What is going on for our results to be achieved?” is the central question rather than “Who reports to whom?” because the contemporary market requires so much flexibility, innovation, adaptation etc. that the structure essentially depends on processes rather than vice versa.

From the process viewpoint, a BS is an entity of the basic, managerial and information processes, and creates the basis for the establishment and judgement of integrability – for more details about the starting points and the methodologies of consideration, see Potocan et al. (2005), Potocan & Kuralt (2007), and Potocan & Mulej (2009). In this respect, as we shall reveal below, the starting point is the basic process producing the final business effects, i.e. products and/or services. Further on, one must build a corresponding managerial and information process for the basic process to be optimal.

The conscious impact on the relevant events and processes includes the following three interacting processes:

1. the basic process (BP) is the one supposed to be influenced and to make the core of the feature dealt with (production, teaching, research, etc.),
2. the information process (IP) is the one producing findings, data, messages and information on and for the basic process, about the natural, social and business environments and an impact on them,
3. the management process (MP) is the one built on decision making and decision execution by a concrete selected action program.

The business processes take place as follows:

(1) Through the basic transformation (BT), the basic process BP transforms the input XB (e.g. materials) into the output YB (e.g. products) and signals S , which all take place under the impact of the managerial actions A . Thus, the BP covers all the basic functions of the business system, and the signals reflecting the inputs XM , the managerial actions A , the basic transformation BT and the outputs YM :

$$BT: (XB \times A) \rightarrow \begin{bmatrix} YB \\ S \end{bmatrix}. \quad (8)$$

(2) All the said processes, events and features are conveyed by the S to the data retrieval process (the signal transformation) i.e. the ST in order to be reflected in the data D . The ST interlinks the basic BP process and information process IP as their intersection, requesting that they both be taken into consideration:

$$ST: S \rightarrow D. \quad (9)$$

(3) Inside the IP , the internal data retrieved D and the external data retrieved XD are transformed

by the data processing (data transformation) DT into the internal messages M and the external ones YM :

$$DT: (XD \times D) \rightarrow \begin{bmatrix} YM \\ M \end{bmatrix}. \quad (10)$$

(4) When the pragmatic dimension is added to the message M , it can become the information I in the message transformation process MT . This is not only an informatics problem, but a management problem, first of all for the reason that: a message can become information only in a given decision-making situation. Hence, the MT can only happen at the intersection of the information process IP and the management process MP :

$$MT: M \rightarrow I. \quad (11)$$

(5) The management process MP , or in its narrower sense the decision-making process (information transformation) IT transforms the internal information I and the external one XI into the internal measures program P and the external one YP . A part of them can be given an algorithm (and eventually be automated later on) because it is a routine; another part is creative and stands for a real decision-making process which can be supported by heuristics and/or systematic heuristics (Beer, 1985; Foerster, 1974; Umpleby, 1990; Mulej, 2007) or other creativity-supporting methods (Umpleby, 1990; Francois, 2004):

$$IT: (XI \times I) \rightarrow \begin{bmatrix} YP \\ P \end{bmatrix}. \quad (12)$$

(6) The IT is followed by the measures programme transformation PT converting the programme decided P into the concrete actions A . Of course, this process is still a part of the management process MP , whereas, at the same time, it is an intervention in the basic process BP (which is the reason for all of the said processes to be existing and consuming all the effort):

$$PT: P \rightarrow A. \quad (13)$$

The cybernetic circle is closed as a dialectical, soft, open and fuzzy system. Every partial process is relatively independent and has its own core activity, but at its start and its end, it is anchored in the other two processes. This confirms that they are merely the three viewpoints of the same feature, not the three isolated systems/entities. If this fact is disregarded, it is very hard to attain the efficiency and

effectiveness of the BS as a whole, not to mention partial sub-optimizations. The three processes cannot be separated. Every element of the BS belongs at the same time to each one of the three processes, however with a different degree of membership and influence.

Taking management into consideration from such a view point implies that there are three partial systems, rather than subsystems, that have to be dealt with; each of them contains all the components of the enterprise as a business process and the corresponding types of their relations, both mutual ones and those with their environment.

A fact has been established that all the three processes are open to the environment and, at the same time, mutually linked to each other: the reproducing (basic) interdependency produces the managerial one, which in its turn produces the information one, and vice versa. Because of the stated interdependencies, the establishment and judgement of integrability should take place as follows:

1. an analysis of the basic processes of potential integration partners, with the focus on the research into their actual and developmental interdependences, and further on, a synthesis of their new reproduction interdependences in a newly-integrated system (the creation of new reproduction relations),
2. the construction of the managerial process, which will be suitable to the new reproduction interdependency, and its decomposition at the managerial level into an integrated system (the creation of new managerial relations),
3. finding out the information needs and the construction of the information system supporting the management of the various single levels and areas in the integrated system (the creation of new information interdependencies),
4. finding out the vice-versa relations of the three sub-processes as partial processes.

Once a transition has been made from stressing the organizational structure only to the systemic consideration of the processes in a BS/SC, restructuring is then deemed to be based on processes. The literature reported on several solutions to creating the integration process, which enables the realization of the different levels of the rationalization and/or synergy of the BS/SC (Ansoff, 1965; Porter, 1987; Grant, 1991; Blanchard, 2006).

The chapter to follow gives an account of how the implementation of the concept of Business Re-

Engineering enables a simultaneous realization of both the rationalization and synergetic effects of the BS/SC through their direct impact on the creation and exploitation of the competitive advantage of the BS/SC.

3.4. The Use of Re-Engineering for the Purpose of Integration

The findings displayed in the previous chapters of the paper yet have not provided an answer to the question of how to tackle the implementation of the attained integrated BS/SC. The traditional methods and programs intended for increasing efficiency in the BS/SC require that the existing structure and processes of an enterprise should be mechanized, automated, rationalized and substantially upgraded by investments. Of course, the potential for improving is pre-restricted to rationalization effects. Out of the several solutions available, and for the purpose of presentation, we have opted for the concept of Business Re-Engineering, which provides a lot of opportunities for achieving not only rationalization, but synergetic effects as well.

Generally speaking, Business Re-Engineering endeavors to achieve a qualitatively new formation of business processes in terms of the so-called "Core Competences" and "Core Processes" (Hammer & Champy, 1993; Hammer, 2004; Daft, 2009; Buchanan & Huczynski, 2010). This formation is the most significant achievement of the synergetic effects aimed at making a major improvement of both the efficiency and effectiveness of both the initial and integrated business systems. The philosophy of Re-Engineering wants to cut down the traditional rationalization of the business operations based on the improvement of the existing structures and processes of an enterprise (see e.g. Hammer & Champy, 1993; Quick & Nelson, 2009; Daft et al., 2012). It studies the previous processes in the enterprise and considers them anew. Moreover, the processes should be re-conceived with the objective of drastically improving both efficiency and effectiveness.

Business Re-Engineering can only be successful if the business process is treated as an entity in a systemic way (see e.g. Potocan et al., 2005; Potocan & Mulej, 2009). This means that in this case the reconstruction comprises the basic process BP, the managerial process MP and the information process IP as partial processes, i.e. includes their relations.

The conceived business process takes place as follows:

$$\rightarrow BP \rightarrow IP \rightarrow MP \rightarrow BP^* \rightarrow \dots \quad (14)$$

or in accordance with the expressions (8) to (13), as the sequence of the transformation

$$\rightarrow BT \rightarrow ST \rightarrow DT \rightarrow MT \rightarrow IT \rightarrow PT \rightarrow BT^* \rightarrow. (15)$$

As it is known, the conceptualization of a process must take place in the opposite direction, i.e. from its end towards its beginning. Taking into consideration the expressions (14) and (15), the conceptualization of the process can be expressed in the following way:

$$BP \rightarrow MP \rightarrow IP \quad (16)$$

or in more detail as:

$$BT \rightarrow PT \rightarrow IT \rightarrow MT \rightarrow DT \rightarrow ST. \quad (17)$$

Only now can the construction of the procedures and the related structure in which our conceived process should operate start. How to tackle the concrete restructuring in the examined case depends on: (a) the important characteristics of the intended integration; (b) them who are the integration partners; (c) what the purpose of the integration is, (d) which its goals are; (e) what kind of linking is at stake (vertical, horizontal, mixed, interdependency); (f) what the institutionalized form of the integration should be etc..

The phases of Re-Engineering are as follows (Mullins, 2007; Daft, 2009; Certo & Certo, 2011):

1. setting the organizational framework (the identification of the key processes, the authorization of the promoters with empowerment, the appointment of the Process Owners, the nomination of the processing teams, etc.),
2. gaining an insight into the existing process (the understanding of the basic tasks of the process, the determination of the requirements from the customers' aspect, etc.),
3. creating a new process concept (a much simpler process, new technologies, a much shorter flow time, many fewer needs for coordination/interventions, in case of more complex processes there are more variants of implementation, etc.),
4. introducing a new process (taking decisive measures in order to introduce a novelty and eliminate resistance, old habits, former centers of power, etc.).

In the case of the application of Re-Engineering in the process of the formation of the integrated BS/SC, the above-described process is simultane-

ously employed at all levels: at the level of the initial BS/SC part and at the level of the integration partners. Namely, the key processes can generate synergetic effects only if they significantly liaise components into one single entity.

Some Conclusions

In the modern-market economy, BSs must permanently strive for the enhancement of the excellence of their operations, which ought to be efficient and effective in order to be successful. A significant improvement of business results can be achieved if BSs and integrations related to BSs, such as the SC, are researched into from all the essential aspects and their relations.

By achieving the optimization of the essential system of the viewpoints of dealing with: (a) links between parts – like departments, plants, etc. in the BS and its corresponding integrations such as the SC; (b) links between BSs as parts of broader business integrations such as SCs; and (c) links between the parts of the BS or BSs in broader integrations with the business and social environments such as vertical or horizontal value changes, for example corresponding SCs, we can make a considerable impact on the quality of the business operations through the innovative restructuring of the business processes and the structures for their implementation. Innovative integration links enable the optimal application of the available sources of the simultaneous implementation of both rationalization and the synergetic effect as well as a direct impact of the creating and use of competitive advantages of the integrations of a BS's or BSs'.

The linking of considered part an integration process enables the formation of new entities qualitatively different from their components. Due to the synergetic effects, a new entity can have characteristics which can only result from the relations of their components. At the same time, by the creation of a new entity, the quality of its components can be influenced. The components gain new properties generated from their new interdependencies.

Integration is conducted on the basis of the systemic reconstruction of the given entities and on the basis of an adequate integration of partners – e.g. the integration of a part of a BS into the corresponding SC or BSs as parts of a broader SC participating in the value chain. Their restructuring is based on the comprehension of the considered business process as a cybernetic entity of the basic, managerial and information partial systems.

The starting point presents the basic process as the process of the formation of effects/results. For the basic process to be optimal, it is necessary that adequate managerial and information processes should be built. All the three processes are inter-dependent and relatively open to the environment.

The creation of new entities – such as SCs – can be supported by an application of the Business Re-Engineering concept enabling the simultaneous attainment of both rationalization and synergetic effects. The objective of the concept is to achieve a significant improvement of the performance and efficiency of both the initial and the integrated entities together with a qualitatively new creation of the strategically important core key business processes. The competitive advantage of the SC and the participating BSs can directly be supported by these processes. **SM**

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✉ Correspondence

Bojan Rosi

Faculty of Logistics Celje
Mariborska cesta 7, 3000, Celje, Slovenia
E-mail: bojan.rosi@um.si