

GREEN QUALITY AND SUPPLY CHAIN MANAGEMENT AS A FACTOR OF SUSTAINABLE COMPETITIVENESS

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Abstract. *The assumption the paper is based on is that in modern economy it is not enough to provide economic performances which will satisfy the owners of the companies and provide product and services which will satisfy customers, considering the relationship between costs and quality. Other two perspectives have to be included into the analysis, and they concern people-society issues and planet-environmental issues. This leads to the concept 3P that includes: Profit, People and Planet. According to this concept, one of the main challenges for the companies and supply chains they belong to will be to provide green product design, green lean processes and operations, as well as green supplying. For this reason, in this paper the authors analyse the green component of the sustainable competitiveness, with the objective to show the way from quality management (quality products and processes) and environmental protection through sustainable supply chain management with the accent on supply chain greening to economy competitiveness.*

Key words: *sustainable, competitiveness, quality management, standards, supply chain*

JEL Classification: Q56, L14

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1. INTRODUCTION: SUSTAINABLE COMPETITIVENESS AS CONTEMPORARY CONCEPT OF ECONOMY DEVELOPMENT

Although competitiveness is important topic in developed, as well as in developing countries, their focus is different. While developed countries must continually improve their soft pillars like innovation, business sophistication, and social cohesion, developing countries must improve both hard and soft pillars. It is obvious that developing countries have to do more, including the fact that they have to identify institutions, policies and factors that make a nation productive in correlation with social and environmental development (Herciu & Ogrean, 2014). Either way, the challenge of all countries in modern conditions definitely concerns sustainability with two main aspects: social and environmental.

In general, the goal of any sustainable development strategy is to strive to balance the three key factors of sustainable development (Vasiljev, 2011): economic development (economy and technology) with social balance and environmental protection (with the rational disposal of natural resources).

In 1990, the European Union adopted the concept of sustainable development, verified by the United Nations at the Second United Nations Conference on Environment and Development, held in Rio de Janeiro in 1992. The concept of sustainable development is institutionalized at a global level, which means that it can only be achieved in the integrated unity of economic, environmental, social, political and cultural components, that is, sustainability. One of the important issues raised at this Conference was to highlight the crucial role of the economy in providing the conditions for achieving sustainable development.

Sustainable growth represents one, but very important component. It means that economic growth has to be based on green technologies (Balkyte & Tvaronavičiene, 2010). Sustainable growth may be provided based on sustainable competitiveness of the economic entities it incorporates. In this sense, sustainable competitiveness goes beyond the economic results including some other elements which contribute to social and environmental results. In order to explain the significance of social and environmental aspects of competitiveness, Aiginger, Barenthaler-Sieber & Vogel (2013) showed the evolutionary way of competitiveness approach: from input-oriented evaluation to outcome-oriented evaluation (Figure 1).

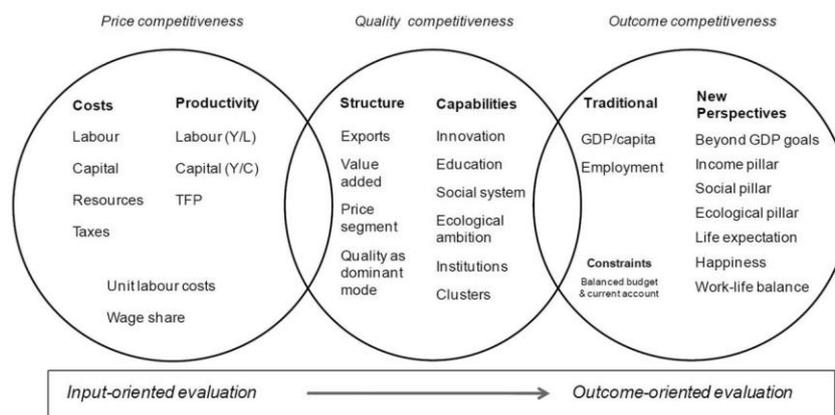


Fig. 1 Towards a concept of competitiveness under new perspectives

Source: Aiginger, Barenthaler-Sieber & Vogel, 2013, p. 11.

A typical definition of outcome competitiveness along these lines is offered by the European Commission (2010): "the ability of an economy to provide its population with high and rising standards of living and high rates of employment on a sustainable basis" (According to Aiginger, Bärenthaler-Sieber & Vogel, 2013). From figure 1 it may be concluded that modern conditions for doing business are more demanding comparing to the Quality Era. Actually, sustainable competitiveness assumes the upgrading of quality with social and environmental pillar.

The importance of those two aspects of sustainability, social and environmental, is emphasized by introducing customized coefficients for the pillars included in Global Competitiveness Index - GCI. Each pillar can be converted into customized coefficients with a score of 0.8 to 1.2, which are used to adjust the GCI results downwards or upwards. Therefore, the result of sustainability adapted to GCI ranges from + - 20% in relation to the basic GCI.

The main idea of the research presented in this paper is to indicate connection between implementation of standards and sustainable competitiveness. Precisely, if greening is present in managing quality and managing supply chain, then positive effects on sustainability have to appear (Figure 2).

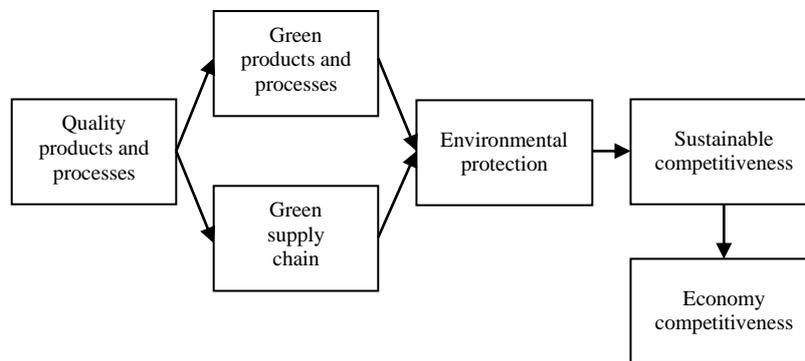


Fig. 2 The influence of *greening* on sustainable competitiveness

Achieving sustainable competitiveness is not only the challenge at the national, economy level, but also at a company level. In fact, sustainable competitiveness of economy and companies are connected. For that reason, the following paragraphs will explain the significance of sustainable competitiveness and then how it can be accomplished at enterprise and supply chain level through the component concerning environmental protection.

2. SUSTAINABILITY AT SUPPLY CHAIN LEVEL

Value creation is vital for companies that operate within the partnership. The goal of each partnership, as well as the supply chain, is profitability based on the fulfillment of consumers' demands by providing adequate value. Value creation implies the provision of high quality products and services. However, besides achieving customer satisfaction in the supply chain, it is also very important to analyze a set of factors that affect the ability of the supply chain to add and create value. The ability to create value is much higher in the situation where there is a stable relationship between partners. The existence of

effective relationships among partners affects the return on investment as well as the increase in the gross margin (Gibbs & Humphries, 2009, p. 158). Therefore, value creation in the supply chain is the result of the built relationships among partners, as well as the maintenance and improvement of these relationships.

Therefore, individual businesses compete no longer as solely autonomous entities, but rather as supply chains (Lambert & Cooper, 2000), which brings the researches one step forward towards supply chain sustainable competitiveness. Implementation of sustainability concept at supply chain level is more difficult than implementation of the same concept at the level of country or individual company. Because of a great number of partners and different individual objectives between them, it is necessary first to define one goal at the supply chain level in the context of environmental protection. However, problems in the implementation of sustainability concept come from the fact that one partner could be part of a few chains. In this regard, the possibility of implementation of the sustainability concept by those partners that are present in several chains is questionable. Especially important is the environmental component of the sustainability. Today, managers of supply chains use this green practice with the purpose of creating satisfaction from the environmental point of view. Also, managers of supply chain use this practice as a strategic weapon for achieving sustainable competitive advantages (Hosseini, 2016).

Sustainable supply chain management could be defined as management of cooperation between partners in supply chain and also management of material and information flows by taking into care economic, environmental and social requirements (Seuring & Muller, 2008). According to Hassini et al. (2012) sustainable supply chain management represents management of process, operations, resources, and information through supply chain with the purpose of maximizing profitability of supply chain and social well-being and minimizing negative environmental impact (Taticchi, Tonelli & Pasqualino, 2013). The process of implementing sustainable solutions in the supply chain is time-consuming and can generate numerous problems that effectively discourage business managers and entrepreneurs from continuing their efforts to implement environmentally-friendly solutions (Zimon, Tyan & Sroufe, 2019, p. 232).

For survival of today's supply chains it is not enough to provide just high economic performances. Sustainable concept includes triple bottom line model. This model shows that supply chain must achieve great performances in each area: environmental, social and economic. Figure 3 shows elements of triple bottom line model (Rogers, 2011; Carter & Rogers, 2008). According to research (Carter & Rogers, 2008) and interviews with 35 managers from 28 companies it was found that there is a strong bond between those factors and sustainability concept. None of the interviewed managers suggested other factors that should be included into the analysis.

Sustainable supply chains must be focused on increasing productivity, but without environment contaminating and with respect to all key stakeholders. In that sense productivity could be achieved by doing more with less, or by reducing costs and resources (Rogers, 2011).

Strategic direction of today's supply chains is building an appropriate sustainability which will provide lasting profitability.



Fig. 3 The Sustainable Supply Chain

Source: Rogers, 2011, p. 12

Organizational culture is very important for providing sustainability at the supply chain level (Lambert, Cooper & Pagh, 1998). It represents the set of attitudes, values and beliefs that are enacted on a day to day basis in an entire supply chain, or, more simply, the way things are done in the supply chain (Epstein, Buhovac & Yuthas, 2010). In modern conditions supply chains have to create organizational culture that incorporates learning and innovation, and provides well defined infrastructure for improvement projects implementation, which means sharing common values and beliefs in order to reach desired quality level based on integration. Sustainability concept has to be embedded into the organizational culture.

Transparency can be a factor of better coordination among partners through supply chain. Common procedures and documentation with the information system at the level of supply chain could provide high degree of transparency and sustainability, by reducing number of transactions and transaction costs (Rogers, 2011). Sustainable supply chain transparency is the visibility and disclosure of sustainable supply chain information between actors within and outside the supply chain (Schäfer, 2022).

Risk management at the company level includes a segment that seeks to eliminate, reduce or control risks (Zsidisin & Wagner, 2010, p. 3). Supply chain risk management follows a fairly traditional risk management process, with focus on identifying and minimizing risk at the supply chain level rather than at the company level (Ghadge, Dani, Chester & Kalawsky, 2013). Supply chain sustainability risk management, as a component of sustainable supply chain management, expands the scope of supply chain risk management by including supply chain risk factors associated with social and environmental aspects of sustainability (Xu et al., 2019).

3. THE INFLUENCE OF PRODUCT/PRODUCTION QUALITY ON THE ENVIRONMENTAL QUALITY

Companies are increasingly faced with natural environmental challenges, more rigorous environmental regulations, and consumers who have awareness of the need to preserve the environment and environmentally friendly products. In this sense, there is an emphasized need to harmonize environmental regulations with EU regulations, to adjust the infrastructure of the company to environmental protection, to innovate technological processes, to rational natural resources management, and to introduce the environmental management system in order to ensure the survival in an increasingly demanding and competitive market. This implies that quality management system and environmental management system have to be connected and balanced. Although some authors (Aiginger, Barenthaler-Sieber & Vogel, 2013) speak about the term outcome competitiveness, this does not mean that quality era is over. On the contrary, this new step forward puts even more attention to quality and standards for providing sustainable economic development.

In fact, during the entire lifetime of the product, it is necessary to take into account ecological parameters, because if it is taken into the account at the stage of development what can happen during the process of their usage or their production in sense of endangering the environment, then the chances for minimizing or avoiding ecological problems are higher. This means that, in each company, special attention must be focused on potential pollution, related to the specific characteristics products and technological processes.

The design and quality of production process is closely related to product design and quality. The production process must not degrade the internal environment of the company, nor its external environment. Finally, ecological approach must be present, not only in design and production, but also during the use and disposal of products.

In the era of mass consumption, quality standards implementation was inspired by economies of scale and facilitated the creation of futures markets (Daviron, 2002). Today, quality standards are focused on production and process methods rather than on the final product (Reardon et al., 2001). According to Guasch, et al. (2007) patterns of trade have significantly changed in that way that an intense competition has eroded the profitability of low-cost manufactures, while, on the other hand, higher-quality markets have not been subject to falling profitability. This also confirms the relevance of quality for achieving sustainable competitive advantage.

This brings into the analysis the question of quality standards. However, it is very important not to observe the certification as an end in itself, either for marketing or for internal reasons, since standards alone cannot produce sustainable improvements in organizational performance (Guasch, et al., 2007, p. 103). Rather, managers must use standards, procedures and tools as means to implement quality management systems and to make quality become the way of doing business. Implementation of quality management system usually assumes two steps: First, it starts with the implementation of quality standard ISO 9001 and then ISO 14001.

The basic objective of the ISO 9001 series is to define a unique system that provides the ability of the product supplier to always ensure the product meets the requirements of the market and the needs of the customer. Advantages of implementing ISO 9001 are not brought into question (Poksinska, Dahlgaard & Eklund, 2003; Feng, Terziovski & Samson, 2007; Sampaio, Saraiva & Guimarães Rodrigues, 2009).

Therefore, at the initiative of numerous international institutions (International Chamber of Commerce, World Industrial Environment Council, British Institute for Standardization and

others), the International Organization for Standardization, in 1994, brought a new set of standards, which deal with the elements of the environmental management system - ISO 14000.

A series of environmental standards includes two basic areas, namely: arranging relationships in the field of environmental protection and determining the impact of the quality of products (services) on the environment and the criteria for their ecological development. In fact, this means that each organization must: reduce the negative impacts on the environment by its activities (Yang, Hong & Modi, 2011), and achieve a continuous improvement in performance related to environmental protection.

A benefit from the application of ecological standards is felt by the society as a whole, or, in other words, by every individual through healthier living conditions. Benefits are also provided to organizations that want to show that they are better than competitors that they take care of environmental protection, of their customers, as well as employees and workers from their internal environment. Therefore, the introduction and implementation of ecological standards is in the recent past, and in the future it will be even more emphasized, presented as an essential condition for the survival of companies on the global market. Under the increasing pressure of international, non-governmental and environmental consumer movements and large-scale supply of all types of goods on the global market, countries with developed economies incorporate in their legislation an obligation to respect environmental protection standards.

Finally, it is important to note that both sets of standards, the standards ISO 9001 and ISO 14001 series, have gained worldwide reputation as the generic standards of the management system. This means that the same standard can apply to any activity and to any organization, small or large, regardless of whether it is production or service organization, in any sector, and regardless of whether the organization is private or state-owned.

4. PRACTICAL IMPLEMENTATION OF GREEN APPROACH IN THE ENTERPRISES IN SERBIA

Governments, community activists, non-governmental organizations (NGOs), consumers and global competition, environmental organizations, as well as academic research community and supply chain actors are the key drivers of developing green working practice (Carbone & Moatti, 2008; Wognum, Bremmers, Trienekens, van der Vorst & Bloemhof, 2011; Hassini, Surti & Searcy, 2012).

Some companies implemented green practice to the extent required by law. Some companies are example of superficial and non-compulsory green working practice, as companies from electronic industry with the motto *Think before you print* (Hassini, Surti & Searcy, 2012).

In modern market conditions, the use of natural resources in production process is very important, especially for textile and clothing industry which are characterized by strong competition and short life cycle. There are well known examples of bad green practice and problems in global companies such as Nike, Levi Strauss, Benetton, Adidas and C&A, with inhuman working conditions and environmental contamination (Caniato et al., 2012, p. 661). Some authors gave the *green fashion* name to the companies with implemented green approach (Kogg, 2003; Forman & Jorgensen, 2004).

According to the research conducted by Carbone & Moatti (2008) companies from automotive, metallurgy, chemicals, electronics are more concerned with green issues than

companies from textile industry. For example, 84% of analysed companies from electronics industry, 87% from chemicals industry and 100% companies from metallurgy are interested in implementation of green approach in their supply chain, while 60% of analysed companies from textile industry are interested in this issue (Carbone & Moatti, 2008).

In order to check the presence of quality management and environmental protection standards in practice of companies and supply chains the research was conducted in the Republic of Serbia, in 2021, on the sample comprising 124 companies. Questionnaire included 25 questions, concerning quality and green issues at company and supply chain level. During the data collection, care was taken that the interviewed managers represent the companies that are partners in certain supply chains. In that way, it was ensured that managers respond to all questions in the questionnaire, including the ones that concern supply chain sustainability. Among those questions, there were a few that concerned four perspectives of supply chain management sustainability, where interviewed managers were offered to suggest some new factors, which they consider important. However, there were no suggestions from managers. Some of the research results are presented in the following paragraphs, with the intention to test the following hypotheses:

- H1 – There is no difference between significance of ISO 9001 and ISO 14001 for increasing company's competitiveness,
- H2 – There is no dependence between company's size and implementation of ISO standards,
- H3 – There is positive correlation between perspectives of supply chain sustainability concept.

In order to test the first hypothesis, managers' marks about the significance of those standards for their business have been used. ISO 9001 standards gained a little better marks (average mark 2.73, compared to 2.35).

According to the research, 63.3% of the companies in the sample have implemented ISO standards (series 9001), while only about 2/3 of them have both very important previously mentioned series of ISO standards (9001 and 14001). In order to test the hypothesis that *there is no dependence between company's size and implementation of ISO standards*, χ^2 test has been used. Based on the test results (sig. equal 0.157 for ISO 9001 and 0.234 for ISO 14001), this hypothesis should be accepted, meaning that there is no dependence between the observed variables.

Most of the companies included in the sample, which are part of certain supply chains, went green and chose quality as a competitiveness strategy due to their partners' requirements (more than 75%). This supports the fact that very small number of companies take care about cost of quality and cost of environmental protection and externalities. Figure 4 shows presence of cost of quality evidence in the observed sample.

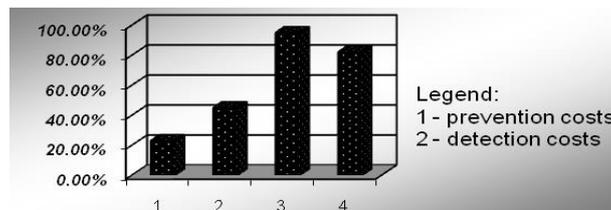


Fig. 4 Costs of quality evidence in the sample

Source: Authors

The situation is not better when it is about externalities. Only 23% of companies in the sample have data about their externalities, and about 36% actually had some kind of investment concerning environmental protection.

In order to evaluate to which extent companies in Serbia are oriented towards sustainability, factors from the four perspectives (Transparency - T, Risk management - R, Strategy - S, Organizational culture - C) were analysed. Those perspectives include different number of factors (Figure 3), precisely, five, five, three and four, respectively. For that reason, and in order to further analyse the collected data, analysis has been performed between factors included into one perspective and its average value correlation.

Table 1 Correlation analysis results

		T	R	S	C
T	Correlation Coefficient	1.000	.139	.114	.051
	Sig. (2-tailed)	.	.125	.209	.572
	N	124	124	124	124
R	Correlation Coefficient	.139	1.000	.047	.038
	Sig. (2-tailed)	.125	.	.608	.678
	N	124	124	124	124
S	Correlation Coefficient	.114	.047	1.000	.145
	Sig. (2-tailed)	.209	.608	.	.107
	N	124	124	124	124
C	Correlation Coefficient	.051	.038	.145	1.000
	Sig. (2-tailed)	.572	.678	.107	.
	N	124	124	124	124

Source: Authors

According to the correlation coefficients (at least around 0.500) and significance (0.000) it has been concluded that average values for each perspective are valid for further analysis. As opposed to those correlations, based on the data from Table 1 it may be noticed that there is no correlation between four perspectives of supply chain management sustainability in the observed companies.

Finally, when it comes to implementation of green concept at supply chain level, the situation is pretty much the same as stated in conclusions of some other authors. For example, as the strongest motive for greening the supply chain managers pointed regulatory constrains (64%) and requirement from partners – existing companies in the supply chain (56%). It is very disappointing that only 16% of interviewed managers stated that the companies they represent implemented green practice into their supply chains because they believe it is the only accepted way for doing business in modern conditions. This is very similar to the research results conducted by Carbone and Moatti (2008). For example, the main motive for designing green supply chain stemming comes from regulatory constraints (73% of the surveyed companies recognized this as a key motive) and improving the image of company and whole supply chain (60% of companies from analysed sample).

5. CONCLUSION

After cost and quality competitiveness comes another era in the economic life and its outcome -competitiveness, meaning that it is not enough just to achieve competitiveness and high economic performances, but also to take care about the human and environmental issues, since it is the only way to make achieved competitiveness sustainable. This applies at company level, as well as at the economy level.

Sustainable development at the macro level depends on efficient and effective use of limited resources. Therefore, each country needs adequate tools for dealing with the problem of the implementation of green law, reducing the use of fossil energy, encouraging of recycling and reuse of waste. These problems are also real at a company level or at supply chain level, bearing in mind that today competitiveness exists between chains and significantly less between companies.

For that reason, this paper presents steps and elements for supply chain sustainability concept implementation, with focus on environmental component of sustainability. Green component of sustainability has roots in quality management. Environmental issues have to be analysed and recognized even during product designing, but especially during production process. The production process must not degrade the internal environment of the company, but neither its external environment. Finally, ecological approach must be present, not only in design and production, but also during the use and disposal of products.

Environmental protection has to be one of the objectives of supply chain management, too. Ability of supply chains for *greening* concerns resource saving and waste reducing, and, based on that, providing competitive advantage. Taking care of the environment at supply chain level is very important since it assumes integrating all process through production life cycle.

According to the research results, quality and environmental issues are not very popular at companies and at supply chain level in Serbia. Compared to some results from the developed countries, it may be concluded that situation is not enviable in the companies in Serbia. Especially, when it is about sustainability concept at supply chain level, it seems that situation is chaotic, rather than balanced and oriented towards environmental protection and, further, sustainability. Another worrying issue is the fact that interviewed managers have not suggested any other factor or element of sustainability that is specific for the environment in which they operate. This is, actually, the confirmation that sustainability still does not have the attention which it deserves in the Republic of Serbia, and which is necessary for achieving and keeping competitiveness. In this regard, future research must be focused on finding the best way to promote the concept of sustainability within the company and also at the level of supply chain, in order to develop awareness of the concept importance, and thus increase the interest of supply chain management for its implementation.

However, the research results can only be conditionally accepted, since the significant limitation is the fact that it was conducted on the relatively small sample. For that reason, there was no statistical approval for conducting the analysis about implementation of standards concerning quality and environmental protection.

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ZELENI KVALITET I UPRAVLJANJE LANCEM SNABDEVANJA KAO FAKTOR ODRŽIVE KONKURENTNOSTI

Pretpostavka na kojoj je baziran rad je da u savremenoj ekonomiji nije dovoljno obezbediti ekonomske performanse, koje će zadovoljiti kupce, s obzirom na odnos troškova i kvaliteta. Druge dve perspektive moraju biti uključene u analizu, a tiču se ljudi - socijalnih pitanja i planete - životne sredine. Ovo dovodi do koncepta 3P: Profit, People i Planet. Prema ovom konceptu, jedan od glavnih izazova za kompanije i lance snabdevanja kojima pripadaju biće obezbeđivanje zelenog dizajna proizvoda, zelenih lean procesa i operacija, kao i zelenog snabdevanja. Iz tog razloga, u radu autori analiziraju zelenu komponentu održive konkurentnosti, sa ciljem da pokažu put od upravljanja kvalitetom (kvalitetnih proizvoda i procesa) i zaštite životne sredine preko održivog upravljanja sa akcentom na ozelenjavanje lanca snabdevanja do konkurentnosti privrede.

Ključne reči: održivost, konkurentnost, upravljanje kvalitetom, standardi, lanac snabdevanja