

А. Мариняк

Познанський університет економіки і бізнесу (Республіка Польща)

## **ЕКОНОМІЧНІ, ЕКОЛОГІЧНІ, МАРКЕТИНГОВІ І ЛОГІСТИЧНІ ЕФЕКТИ ІНТЕЛЕКТУАЛЬНОГО КАПІТАЛУ В РЕЗУЛЬТАТІ ІМПЛЕМЕНТАЦІЇ “ЗЕЛЕНИХ” ЛАНЦЮГІВ ПОСТАВОК**

© Мариняк А., 2017

Метою поданого теоретико-пізнавального і аналітичного дослідження є побудова дослідницької моделі для оцінювання кореляції між інтелектуальним капіталом, що бере участь в управлінні ланцюжком поставок і результатами, отриманими у результаті реалізації “зелених” заходів у ланцюзі поставок. У результаті проведених досліджень ми спостерігали зокрема, що вищий рівень людського капіталу пов’язаний з більшою економічною ефективністю. Запропоновано деякі нові напрямки наукових досліджень, що ґрунтуються на “Ресурсному підході” та “Теорії зацікавлених сторін”.

**Ключові слова:** інтелектуальний капітал, “зелений” ланцюг поставок, корпоративна соціальна відповідальність, ланцюг поставок, ефекти інтелектуального капіталу.

А. Maryniak

Poznań university of economics and business

## **ECONOMIC, ENVIRONMENTAL, MARKETING AND LOGISTIC EFFECTS OF INTELLECTUAL CAPITAL RESULTING FROM THE IMPLEMENTATION OF GREEN SUPPLY CHAINS**

© Maryniak A., 2017

This is a theoretical-cognitive and analytical study, which aim is to construct a research model to measure the correlations between intellectual capital involved in the management of a supply chain and the results obtained from the implementation of green activities in a supply chain. This study is an attempt to deepen the subject related to the interplay of intellectual capital and Green Supply Chain Management (GSCM). The choice of the subject arises from: the research interests of the author, the fact that nowadays competition takes place on the level of supply chains, not on the level of individual companies and the awareness that there is a strong need to deepen the knowledge about intangible assets of companies in the context of improving environmental efficiency. The results obtained from green supply chain management depend on the level of intellectual capital development of companies. A developed IT system, an effective knowledge diffusion inside and outside of the organization, having certificates supporting supply chain management, a developed motivation system, long-term contracts with clients, a loyalty of suppliers and many more elements contributing to intellectual capital, probably facilitate the green supply management and simultaneously allows for obtaining better results in this area.

The goal is to adopt the following hypothesis: H: The higher level of the development of intellectual capital (involved in supply chain management) is related to better results obtained through green activities implementation in a supply chain. The part of the questionnaire regarding

intellectual capital consisted of 42 test items – 14 for each out of three types of capital. Regarding each test item, the respondents could mark one of the following answers: 2 (a declaration that the given element of capital included in the question is at a sufficient (high) level of development), 1 (a declaration that the given element of capital included in the question requires either implementation or development) or 3 (a declaration that the given element of capital included in the question doesn't exist due to the characteristics of the company).

As a result of the research we observed, among others, that the higher level of human capital is related to higher economic performance. In this article, we are also suggesting some new research directions with reference to Resource-Based View and Stakeholders Theory. On the basis of the obtained data, it can be claimed that companies, which have intellectual capital on a higher level obtain significantly better economic results in GSCM than companies, which have this capital on a lower level. For example, a well-developed training system, a motivation system, sharing non-codified knowledge, a huge experience of employees or limiting rotations of employees contributes to an easier implementation of green activities. The companies, which want to implement GSCM, should first verify the potential of such capital. Therefore, it seems that it is a critical point in the process of the implementation of green supply chains. Considering the relations of each type of capital, confirmed in numerous research, we can assume that relational and organizational capital have a meaning, but a secondary one. Human capital alone, in interaction with other types of capital improves significantly economic and marketing-logistic results.

**Key words:** intellectual capital, green supply chain, corporate social responsibility, supply chain and the effects of intellectual capital.

**Statement of the problem.** Nowadays, focusing only on financial and material resources is insufficient to position a company against competitors. As a result, companies more often look for a value in intangible assets, which make up intellectual capital. Therefore, in the literature of the subject, there are discussions on how to unblock the value of the hidden assets; how to discover and to use the human talent, how to use the corporate knowledge in culture, organizational systems and processes [28].

The interest in intellectual capital is increasing both among the scholars (Stewart, Sveiby, Kaplan, Edvinsson, Norton, Drucker, Devenport), business practitioners and among consulting companies (Skandia AFS, Xerox, WM-Data, Hewlett-Packard, DaimlerChrysler, Siemens, Deloitte & Touche, PricewaterhouseCoopers, Ernst & Young, Arthur Andersen, KPMG). Also, there are many theoretical and empirical studies about intellectual capital from the perspective of micro- and macroeconomics or countries including the Polish market. [5; 6; 10; 13; 20; 21; 23; 24; 26; 27]. As a result of this, the new areas of research appear.

This study is an attempt to deepen the subject related to the interplay of intellectual capital and Green Supply Chain Management (GSCM). The choice of the subject arises from: the research interests of the author, the fact that nowadays competition takes place on the level of supply chains, not on the level of individual companies and the awareness that there is a strong need to deepen the knowledge about intangible assets of companies in the context of improving environmental efficiency. This is of a great importance, because we lack this kind of considerations both in the Polish as well as in the world's literature. This is not a fad, but a strong trend, which is a response to the needs of modern and future generations.

**Analysis of recent research and publications.** In the literature of the subject, dominate studies, which are joining the subject of intellectual capital and sustainable actions, including green actions. For example, Akhtar and Bahru [1] prove that intellectual capital has a significant influence over the sustainable development of small and medium companies. Ketikidis, Bulata and Lazuras [14] claim that intellectual capital is a backbone of competitive advantage, which can be built on sustainable activities. Chen [7] observed that each of the fundamental types of green intellectual capital (human, structural and relational) has a positive impact on gaining the competitive advantage. Yang and the co-authors [34] prove that green innovations, culture and structure are characterized by mutual relationships. Liu [19] presents

the benefits, which result from green intellectual capital management. Huang and Kung [12] proves that environmental awareness has an indirect impact on creating the competitive advantage through making investments in green intellectual capital.

However, there are not enough studies, in which the above-mentioned issues are discussed from the perspective of a supply chain. For example, Baresel-Bofinger et al. [3] claim that intellectual can have a positive impact on company's capacity to implement green practices in a supply chain. Yahya, Arshad and Kamaluddin [33] offer a model to measure green intellectual capital, the model also includes the elements related to a supply chain. Fang and Lin [11] present a conceptual study, on which basis, it is possible to examine the relationship of human, organization and relation capital with competitive advantage gained through implementing GSCM.

However, most authors carry the considerations from the perspective of the chosen elements of intellectual capital and don't discuss it in a holistic way, including each type of the capital, of which its specification consists. For example, Lazuras, Ketikidis and Baresel-Bofinger [17] discuss the green supply chain issues from the perspective of human capital management, Li et al. [18] examine the relations and the process of sharing knowledge in a green supply chain, Arenhardt and the co-authors [2] deal with the topic of adopting green innovations on the way of gaining the competitive advantage.

Therefore, in this research, we applied a broader approach, which includes the two fundamental aims. The first aim of the study is to create a conceptual model, which identifies the relationships between intellectual capital involved in supply chain management and the results obtained through green supply chain management implementation. The second aim is to conduct an empirical test with the use of the constructed model. The aims formulated in such a way, simultaneously contribute to the subject of sustainable development, broadly discussed in the literature of the subject and included in many documents at the EU and the global level. Companies selecting the direction of sustainable development, use intangible assets, in order to undertake green actions. Therefore, we can assume that the results obtained from green supply chain management depend on the level of intellectual capital development of companies. A developed IT system, an effective knowledge diffusion inside and outside of the organization, having certificates supporting supply chain management, a developed motivation system, long-term contracts with clients, a loyalty of suppliers and many more elements contributing to intellectual capital, probably facilitate the green supply management and simultaneously allows for obtaining better results in this area.

**Goals of the article.** The goal is to adopt the following hypothesis: H. The higher level of the development of intellectual capital (involved in supply chain management) is related to better results obtained through green activities implementation in a supply chain.

**The main material of research.** The research consists of some main points, as following:

1. **Intellectual capital.** In this study, intellectual capital is characterized by a model, which consists of: human capital, customer capital (relational capital) and structure (organizational) capital [9; 28; 29]<sup>1</sup>. We have distinguished the fundamental components of intellectual capital on the basis of the literature of the subject, also we verified their contents on the basis of the pilot studies. In pilot studies, we tried to draw our attention to the components of intellectual capital, which are especially related to supply chain management. In sum, we distinguished forty-two positions in three modules.

Organizational capital includes: organizational structure, data management, knowledge diffusion inside organization, supply chain strategy, management-employee relations, innovations, IT programs, process management, risk management, flexibility/quick reaction to necessary changes, organizational culture, laws of intellectual property/patents licenses, indicator based assessment of a supply chain, certificates supporting supply chain management.

---

<sup>1</sup> The intensive development of work in the field of intellectual capital can be dated from 1987, when the first method of tangible assets measurement and management was created. The concept developed thanks to the work of

Human capital includes: knowledge of employees, experience, system of trainings, entrepreneurship, motivation system, transparency of carrier path, sharing non-codified knowledge, taking responsibility for tasks, assessment system of suitability for the given position, recruitment system, limitation of employee rotation, number of people employed on operational positions, number of people employed on administrative and management positions, satisfaction from execution of tasks.

Relational capital includes: long-term contracts with clients, distribution channels, supply channels, exchange of knowledge between company and supplier, exchange of knowledge between company and receiver/third-party, loyalty of suppliers, loyalty of receivers/third-parties, end-customers/clients expectation research, relations with potential investors, logistic activities outsourcing, co-operation with consulting firms/organizations, which support supply chain management, transparency of supply chain, image of a supply chain, using the potential of other (neutral or competitive) supply chains.

We can classify the methods of intellectual measure into four main groups, which are described by the four dimensions of the matrix: non-monetary valuation and monetary valuation, the level of each component of intellectual capital, the level of the whole organization. Sveiby [30] distinguished several dozens of different methods in his study. However, in this study, we applied a proprietary method, which has the following dimensions: non-monetary valuation and the level of intellectual capital components. All the methods, which referred to number and value dimensions, in our case would make it more difficult to gather reliable data, because together with the questions related to green results, they would make the questionnaire too detailed. The applied method was used, above all, to determine at what level of the development of intellectual capital used in supply chain management are the investigated companies. To the group of enterprises with a high level of development, we classified these companies, which considered that this level is high and doesn't need further investments. The group of enterprises with a lower level of development includes these companies, which declared that intellectual capital, regarding each specification, requires either implementation or is not at the sufficient level of development.

The part of the questionnaire regarding intellectual capital consisted of 42 test items – 14 for each out of three types of capital. Regarding each test item, the respondents could mark one of the following answers: 2 (a declaration that the given element of capital included in the question is at a sufficient (high) level of development), 1 (a declaration that the given element of capital included in the question requires either implementation or development) or 3 (a declaration that the given element of capital included in the question doesn't exist due to the characteristics of the company).

**1. GSCM results.** The list of specifications, characterizing the results obtained through the implementation of green activities in a supply chain, was prepared on the basis of the literature review [4; 8; 16; 25; 31; 32]. The set of literature items covering this topic is much bigger, however their thematic range is similar. The division of test items was made naturally by aggregating them into three major thematic groups. The first group included items, which regarded *economic results*. Here the following items were qualified: increase of sales, reduction of costs of materials/natural resources, reduction of production costs, reduction of distribution costs, increase of income, improving the general level of profitability, increase of investments, higher level of efficiency, better use of the potential/resources, better indicators of effectiveness in case of logistic operations, optimization of supply chain configuration, lowering the level of supplies.

In the second group, we distinguished the results regarding strictly *environmental* aspects. These are: implementation of environmental protection policy, systemic approach to environmental protection, reduction of the number of environmental accidents, improvement of the compliance with environmental protection norms, reduction of waste amount, better waste management, reduction of material use, reduction of harmful material use, reduction of energy use, reduction of water use, reduction of CO<sub>2</sub> emission to atmosphere, reduction of soil contamination.

In the last group, we distinguished the test items regarding strictly *marketing and logistics* aspects. In this module, we distinguished: obtaining competitive advantage, improvement of image, increase of

---

the seven Swedish people belonging to the so-called Conrad's group. The classification of capital applied by the group evolved with time in terms of structure and nomenclature.

market share, more innovative business processes, more innovative products, more flexibility in terms of production, improvement of relations with suppliers/third-parties, improvement of relations with target clients (enterprises, institutions, consumers), improvement of relations with companies of shipping-transport-logistics sector, more flexible logistic operations, more competitive supply chain comparing to other supply chains, differentiating from competition.

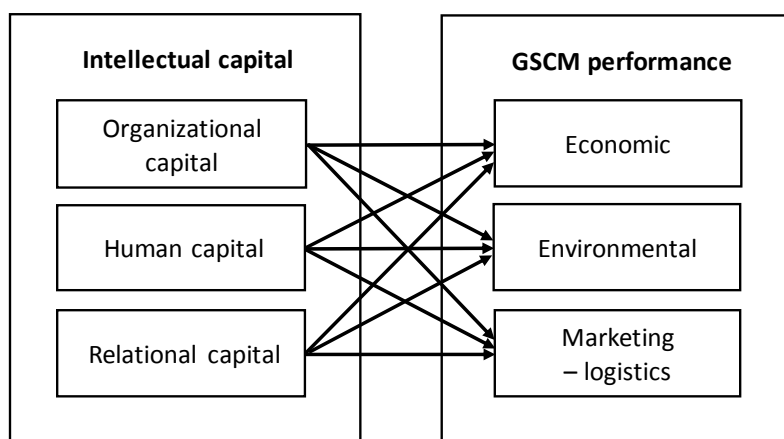
The part of the questionnaire regarding the results consisted of 37 test items. The number of questions regarding: economic results equaled 12, environmental results equaled 12, marketing-logistic equaled 13. The scale for the part of the questionnaire regarding the results, was 5 point Likert's scale, in which 5 meant the highest level of agreement, whereas 1 meant a definite lack of agreement that implementation of green actions influences the factor described in the test position. The applied scale is usually used when analyzing the green results.

**2. Research scheme.** As a result of the conducted study, we distinguished six constructs and formulated the following nine research hypotheses:

H1. The higher level of the development of organizational capital (involved in supply chain management) is related to higher economic results (obtained through green activities implementation in a supply chain). Analogically, other hypotheses concern the relationships: H2. Organizational capital – marketing and logistic results; H3. organizational capital – environmental results; H4. Human capital – marketing and logistic results; H5. Human capital – economic results; H6. Human capital – environmental results; H7. Relational capital – economic results; H8. relational capital – environmental results; H9. Relational capital – marketing and logistic results.

In further research, therefore, we tested the hypotheses regarding the relationship of the level of: intellectual, organizational, human, relational capital involved in supply chain management, with green results obtained by companies in economic, marketing and logistic and environmental area (Figure 1). Both the level of intellectual capital development and the level of the obtained results is measured by an average of the responses according to the scale described in the methodological part of this study.

3. Subject of the research and descriptive statistics. Manufacturing companies from the Wielkopolska Province were qualified for the research. The special scope of the research was determined by the capacity of the surveyors to access directly the company's headquarters. A total of 73 companies, which employ above 48 employees, were surveyed. The companies were chosen randomly, on a basis of the list of companies bought in Central Statistical Office. The proprietary survey questionnaire had the three groups of questions related to intellectual capital and the three groups of questions regarding the elements of GSCM.



*Figure 1. Relationships between organizational, human, relational and intellectual capital and economic, environmental and marketing-logistic results.*

Source: Own elaborate

For the purpose of further analytical work, we calculated the indicators of variables included in the research, so variables, such as capital: organizational, human, relational; results: economic, environmental, marketing and logistic. All indicators were calculated by averaging the values of the responses provided by the respondents on questions regarding the given variable (which means that each respondent got 8 averages – each for a question regarding each type of intellectual capital and each type of results)<sup>1</sup>.

In order to make statistically significant the comparison of the average results in the analyzed groups, with the use of variance analysis, we should first determine, if the variables have a distribution approximate to normal. For this purpose, we applied the most often used Kolmogorov-Smirnov test. The averages of summary results (for variables: “results”), averages of averaged results (for variables: “capital”), standard deviation, values of K-S test and their level of significance for green results obtained by companies and for types of intellectual capital are presented in Table 1.

Table 1

Descriptive statistics, test K-S for green results and types of intellectual capital					
		<i>M</i>	<i>SD</i>	<i>K-S</i>	<i>p</i>
Capital	organizational	1.65	0.27	0.1	0.06
	human	1.62	0.28	0.1	0.06
	relational	1.65	0.26	0.1	0.20
Results	economic	35.66	9.12	0.06	0.20
	marketing-logistic	42.64	9.40	0.1	0.20
	environmental	43.7	8.43	0.15*	0.00

\*Significant results of Kolmogorov-Smirnov test having a distribution other than normal;

*M* – average, *SD* – standard deviation, *K-S* – result of Kolmogorov-Smirnov test, *p* – statistical significance of Kolmogorov-Smirnov test result

Source: Own study based on direct studies

In the further research, we conducted a series of correlation tests, to examine the relations between each type of intellectual capital and each type of results. Since all variables, apart from environmental results and economic results don't have normal distribution, we used Spearman's correlation index. In case of the variable „results”, the higher is the result (the bigger is the value), the bigger are the effects obtained from involving in green activities. In case of the variable “capital”, the higher is the value, the higher is the level of the capital. In Table 2, you can see the results of correlation analyses (rho-Spearman's value with significance levels).

Table 2

	Organizational capital	Human capital	Relational capital
Economic results	<i>rho</i> = 0.16	<i>rho</i> = 0.29*	<i>rho</i> = 0.19
	<i>p</i> = 0.18	<i>p</i> = 0.01	<i>p</i> = 0.10
Marketing and logistic results	<i>rho</i> = 0.18	<i>rho</i> = 0.14	<i>rho</i> = 0.12
	<i>p</i> = 0.13	<i>p</i> = 0.25	<i>p</i> = 0.32
Environmental results	<i>rho</i> = 0.23*	<i>rho</i> = 0.18	<i>rho</i> = 0.16
	<i>p</i> = 0.04	<i>p</i> = 0.12	<i>p</i> = 0.16

\* Results statistically significant

Source: Own study based on direct studies

<sup>1</sup> It should be noted that in case of each respondent, we excluded from the analysis these questions about intellectual capital, for which the respondent answered, marking “3” (so these elements, which are not relevant to the given company), therefore in relation to some respondents, the average was not calculated with 14 in denominator.

Two in all analyzed relations turned out to be statistically significant (they are highlighted in Table 2). This concerns the pairs: organizational capital -environmental results and human capital – economic results. Therefore, hypotheses H3 and H4 were confirmed by the data. In the next stage, we formulated the hypotheses concerning the impact of intellectual capital level on results obtained by companies. We examined, if intellectual capital differentiates companies according to the level of the results. Therefore, we formulated the following hypothesis:

*H 10. The level of organizational capital differentiates companies in terms of economic results.*

Analogically, in the same set of pairs like hypotheses H2-H9., we formulated hypotheses H11-H18. In order to examine the above relations, we used single variant analysis. In order to deepen --our analyses, we additionally checked the effects of the interaction between the types of capital. In case of environmental results, we used the non-parametric Kruskal-Wallis test, due to distribution of variables. On the basis of the median, we also divided the companies into those with a high and a low capital in the three areas. We obtained significant relations for economic and marketing-logistic results. It turned out that companies with a high level of human capital obtain better economic results than companies with lower level of human capital  $F(1, 72) = 4.84, p = 0.03, \eta^2 = 0.07$ . This is a medium effect. Also, it turned out that the effect of the interaction between human and relational capital is significant to economic results  $F(1, 72) = 4.52, p = 0.03, \eta^2 = 0.06$ . In this case, we can also say that the effect is medium.

For marketing-logistic results, the interaction between the level of organizational and human capital  $F(1, 72) = 6.45, p = 0.01, \eta^2 = 0.09$ , as well as between the level of human and relational capital  $F(1, 72) = 8.38, p = 0.005, \eta^2 = 0.11$  turned out to be significant. Here, we can say that the effect is medium in the first example, and strong in the second one. The graphic representation of interaction impact is presented in Figure 2a, 2b and 2c below. In the conducted analysis, the relations estimated with the use of Kruskal-Wallis test turned out to be insignificant. The lack of confirmation for the hypothesis concerning “differentiation”, related to the pair: “organizational capital – environmental results” (H12), may result from the character of the distribution of the variable “environmental capital”. The obtained results of the correlation analysis are at the edge of significance. Moreover, the correlation alone, explains little over 5 % of variability. Therefore, we should treat this relation as a trend, which we should examine additionally in the future.

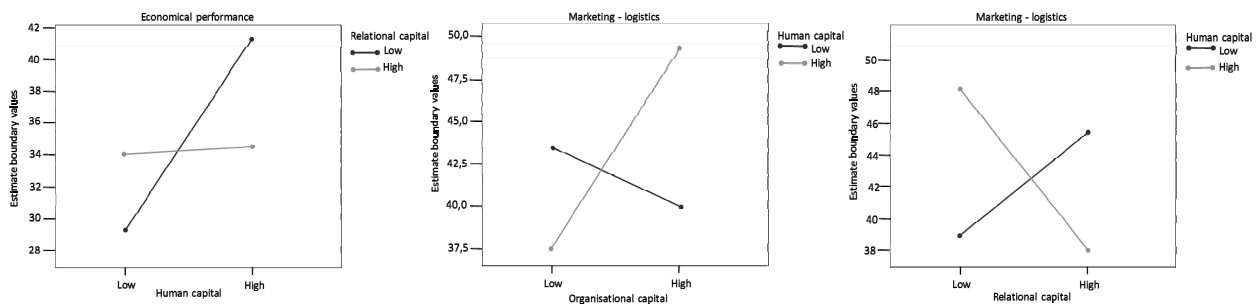


Figure 2a, b, c. Interactions between each type of intellectual capital

Source: Own study based on direct studies

Thus, the hypothesis concerning “differentiation” (H13), which relates to the pair: “human capital – economic results” was confirmed by the research, which can prove the causal influence of the level of human capital on economic results. Apart from this, we pointed to the interaction character of the influence of the human capital level and relational capital level on economic results and organizational capital level and human capital level, as well as human capital level and relational capital level on marketing-logistic results.

**Conclusions and further research prospects.** On the basis of the obtained data, it can be claimed that companies, which have intellectual capital on a higher level obtain significantly better economic results in GSCM than companies, which have this capital on a lower level. For example, a well-developed training system, a motivation system, sharing non-codified knowledge, a huge experience of employees or limiting rotations of employees contributes to an easier implementation of green activities. The companies, which want to implement GSCM, should first verify the potential of such capital. Therefore, it seems that it is a critical point in the process of the implementation of green supply chains. Considering the relations of each type of capital, confirmed in numerous research, we can assume that relational and organizational capital have a meaning, but a secondary one. Human capital alone, in interaction with other types of capital improves significantly economic and marketing-logistic results.

The conducted research has a pioneer character, therefore it's impossible to conduct benchmark analyses. In the future, thus, it will be sensible to conduct the research on a bigger group of companies. To identify behavioristic aspects and to deepen the causal analysis it is also worth conducting the research in a form of a case study.

The further research procedure should develop both in empirical and theoretical area.

On the theoretical-empirical surface, the inspiration regarding the future research can be taken, among others, from publications, in which the authors refer to theories explaining the phenomena of intellectual capital management [22], as well as supply chain management [15]. These are, among others, Resource-Based View and Theory of Stakeholders.

Apart from the consensus concerning the taxonomy of resources and according to Resource-Based View, companies build their competitive advantage, especially on intangible resources (in a broader sense). Therefore, it is important to examine, what contribution to the implementation of green supply chains and its results have material resources in comparison with intangible assets. The transfer of knowledge in this area, along the supply chain, will allow for improving the competitive advantage of each chain element and the supply chain as a whole. Sharing resources and making unique configurations of them, in this case postpones the time of their limitation.

Referring to the Theory of Stakeholders, it is sensible to examine the issues of using intellectual capital and its migration along the supply chain in the context of GSCM. In the descriptive area, it is important to answer the question on how to meet different expectations of different stakeholders and to which extent we should involve their intellectual capital in order to fulfil common green aims. In the instrumental field, it is purposeful to discuss, which green activities bring the best effects for internal and external stakeholders and what this implies for intellectual capital development.

Moreover, it is worth completing the research with a dynamic perspective. It would be an interesting, unexplored and deepening issue to find the answer to the question:

What is the chronology of GSCM results migration when we increase GSCM result level?

1. Akhtar Ch.S., Bahru J. *Can Intellectual Capital of SMEs Help in Their Sustainability Efforts*, *Journal of Management Research*. 2015. No. 7(2). P. 82–97. 2. Arenhardt D., Battistella L. F., Arenhardt D. L., Grohmann M. Z. *The Influence of the Green Innovation in the Search of Competitive Advantage of Enterprises of the Electrical and Electronic Brazilian Sectors*, *International Journal of Innovation Management*. 2016. No. 20(1). P. 1650004-1-21. 3. Baresel-Bofinger A. C.R., Ketikidis P. H. Koh S. C.L., Cullen J. *Role of Green Knowledge in the Environmental Transformation of the Supply Chain: The Case of Greek Manufacturing*, *International Journal of Knowledge-Based Development*. 2011. No. 2(1). P. 107–128. 4. Bhateja A. K., Babbar R., Singh S., Sachdeva A. *Study of Green Supply Chain Management in the Indian Manufacturing Industries: A Literature Review cum an Analytical Approach for the Measurement of Performance*, *Journal of Computational Engineering & Management*. 2011. No. 13.



P. 84–99. 5. Bombiak E. *Kapitał intelektualny przedsiębiorstwa – kluczowy majątek współczesnych organizacji*, Zeszyty Naukowe Uniwersytetu Przyrodniczo-Humanistycznego w Siedlcach, Seria: Administracja i Zarządzanie. 2013. No. 96. P. 71–86. 6. Bratnicki M., Strużyna J. *Przedsiębiorczość i kapitał intelektualny*, Katowice: Wydawnictwo Akademii Ekonomicznej im. K. Adamieckiego w Katowicach, 2001. 7. Chen Y. S. *The Positive Effect of Green Intellectual Capital on Competitive Advantages of Firms*, *Journal of Business Ethics*. 2008. No. 77(3). P. 271–286. 8. Chien M. K., Shih L. H. *An Empirical Study of the Implementation of Green Supply Chain Management Practices in the Electrical and Electronic Industry and their Relation to Organizational Performances*, *International Journal of Science and Technology*. 2007. No. 4(3). P. 383–394. 9. Edvinsson L., Malone M. S. *Intellectual Capital*, London: Piatkus. 1997. 10. Ejsmont K., Werpachowski W. *Model pomiaru i oceny kapitału intelektualnego w przedsiębiorstwie*, *Przedsiębiorczość i Zarządzanie*. 2014. No. 15(6). P. 137–151. 11. Fang S. C., Lin S. L. *Green Supply Chain Management as Competitive Advantage: A Perspective of Intellectual Capital*, *Chaoyang Business and Management Review*. 2007. No. 6 (special edition). P. 79–102. 12. Huang C. L., Kung F. H. *Environmental Consciousness and Intellectual Capital Management: Evidence from Taiwan's Manufacturing Industry*, *Management Decision*. 2011. No. 49(9). P. 1405–1425. 13. Kaczmarek B. *Kapitał intelektualny (wiedza) a kreowanie wizji przedsiębiorstwa, Nierówności Społeczne a Wzrost Gospodarczy*. 2005. No. 7. P. 319–329. 14. Ketikidis P. H., Bulata C., Lazuras L. *The Intellectual Capital – Environmental Practices, Performance and Their Relationships in the Romanian Banking Sector*, *Proceedings of the 5th International Forum on Knowledge Asset Dynamics, Matera, Italy, 24–25 June 2010*. 2010. 15. Kotzab H., Mikkola J. H., Skjøtt-Larsen T. *Complementary Theories to Supply Chain Management*, *Supply Chain Management*. 2007. No. 12(4). P. 284–296. 16. Laosirihongthong T., Adebajo D., Tan K. *Green Supply Chain Management Practices and Performance*, *Industrial Management & Data Systems*. 2013. No. 113(8). P. 1–27. 17. Lazuras L., Ketikidis P. H., Baresel-Bofinger A.C. R. *Promoting Green Supply Chain Management: The Role of the Human Factor*, *15th Panhellenic Logistics Conference and 1st Southeast European Congress on Supply Chain Management, Thessaloniki, Greece, 11–12 November 2011*. 2011. 18. Li S., Ragu-Nathan B., Ragu-Nathan T. S., Rao S. S. *The Impact of Supply Chain Management Practices on Competitive Advantage and Organizational Performance*. 2016. *Omega*. No. 34. P. 107–112. 19. Liu Ch. Ch. *Developing Green Intellectual Capital in Companies by AHP*, *Supply Chain Management and Information Systems (SCMIS), 2010 8th International Conference on Supply Chain Management and Information*. 2010. 20. Michalski B. *Kapitał intelektualny a międzynarodowa konkurencyjność gospodarki*, w: Dudek M. (red.) *Integracja i europejski rynek pracy*, Uniwersytet Zielonogórski, Legnica – Zielona Góra: Wyższa Szkoła Menedżerska. 2006. P. 120–132. 21. Nycz M., Smok B. *Jak mierzyć kapitał intelektualny*, w: Porębska-Miąc T., Sroka H. (red.) *Systemy wspomagania organizacji*, Katowice: AE w Katowicach. 2005. P. 321–337. 22. Petty R., Guthrie J. *Intellectual Capital Literature Review: Measurement, Reporting and Management*, *Journal of Intellectual Capital*. 2000. No. 1(2). P. 155–176. 23. Piasny B. *Zarządzanie wiedzą i kreowanie kapitału intelektualnego we współczesnym przedsiębiorstwie, Nierówności społeczne a wzrost gospodarczy*. 2013. No. 36. P. 137–149. 24. Prusak R. *Kapitał intelektualny jako element budowania przewag konkurencyjnych*, *Logistyka*. 2014. No. 6. P. 12397–12400. 25. Rha J. S. *The Impact of Green Supply Chain Practices on Supply Chain Performance*, Nebraska: University of Nebraska. 2010. 26. Rószkiewicz M., Węziak-Białowolska D. *Pomiar i modelowanie kapitału intelektualnego regionu na przykładzie Polski*, *Gospodarka Narodowa*. 2008. No. 10. P. 45–67. 27. Różycka A. *Zarządzanie kapitałem intelektualnym a innowacyjność przedsiębiorstwa w: Finanse. Rynki finansowe. Ubezpieczenia*, Zeszyty Naukowe Uniwersytetu Szczecińskiego, Szczecin: Uniwersytet Szczeciński, 2013. No. 64 <http://yadda.icm.edu.pl/yadda/element/bwmeta1.element.ekon-element-7260f7fd-ba81-308e-b899-7cf2e0eeb40a>, P. 601–607. 28. Stewart T. A. *Intellectual Capital: The New Wealth of Organizations*, New York:

Doubleday Dell Publishing Group, Inc. 1997. 29. Sveiby K. E. *The New Organizational Wealth: Managing and Measuring Knowledge Based Assets*, San Francisco: Berrett-Koehler Pub. Inc. 1997. 30. Sveiby K. E. *Methods for Measuring Intangible Assets*, 2001. <http://www.sveiby.com/articles/IntangibleMethods.htm>. 31. Zhu Q., Sarkis J., Geng Y. *Green Supply Chain Management in China: Pressures, Practices and Performance*. *International Journal of Operations & Production Management*. 2005. No. 25(5). P. 449–468. 32. Zhu Q., Sarkis J. *Relationships Between Operational Practices and Performance Among Early Adopters of Green Supply Chain Management Practices in Chinese Manufacturing Enterprises*, *Journal of Operations Management*. 2004. No. 22(3). P. 265–289. 33. Yahya N. A., Arshad R., Kamaluddin A. *Measuring Green Intellectual Capital in Malaysian Environmentally Sensitive Companies*, *International Journal Business and Management*. 2014. No. 1(2). P. 92–96. 34. Yang Z., Sun J., Zhang Y., Wang Y. *Green Information Systems, Green Culture and Green Innovation Effectiveness: a Triad Model*, Taiwan, Republic of China: *Proceedings of 20th Pacific Asia Conference on Information Systems (PACIS 2016)*. 2016.