

# Management of Human Resources and Quality in Materials Supply Process in Construction Projects

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**Abstract** – Construction projects participants were surveyed to assess how coordination and communication among stakeholders and quality control in building materials supply process were managed, as well as to evaluate their satisfaction with the structures quality. It was found that the participants' role and working experience had a statistically significant interaction effect on satisfaction with the structures quality, but their effect on perceived coordination and communication among stakeholders and materials' quality control wasn't statistically significant. The results were discussed in light of their importance for effective construction project management from the aspect of human resources, building materials quality and satisfaction with the quality of structures.

**Keywords** – construction project, Human resources management, Quality management, materials supply process, satisfaction.

## 1. Introduction

The changes in technology have a direct impact on the construction sector. Construction projects are getting more complicated and dependent on many factors. Therefore, it is getting more difficult to complete the projects within the limited budgets and planned time frames, and with the necessary quality. Since these three aspects, i.e. the delivery of completed structure within the agreed period of time, costs and quality [1] are crucial for customers, the goal to satisfy them has become increasingly challenging for construction companies. The assurance of the quality of the structure has to be ensured during the design and construction stage of the project and has to be accompanied by the correct specifications and use of proper materials [2], as the achieved quality is closely related to the customer's evaluation of the construction performance [3].

Building materials (BMs) are one of the main resources of any construction project; it is estimated that the material costs cover more than 50% of all the costs of the project [4] and, according to [5], materials may add up to 70% of the project construction costs. Therefore, it is important to practice effective management of material costs in order to maintain competitiveness of the suppliers on the market [6].

According to [7], costs referred to the purchase and inventory management of materials are related to the purchase, order, holding and shortage. Thus, having the building materials in the right place and in-time is of essential importance for the project participants [5]. BMs should be supplied at optimal time, because if BMs are supplied before they are needed, it can result in additional costs, mostly due to their storage. Additionally, their storage and improper handling may cause problems in locating and tracking the building materials at the construction site [8]. That situation is usually followed by losing time for BMs locating or storage-rearranging [9]. To reduce the costs for materials, especially the total logistic costs,


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companies should consider the option of outsourcing the supply logistics processes [4]. Material procurement process can also be supported by e-commerce solutions which, in integration with building information modelling, enable to provide accurate cost estimating reports [10]. On the other hand, if the building materials are not supplied at the right time and to the right place, this will result in a shortage of materials, low work performance, delays and increase in construction costs.

Materials supply management in construction can help in preventing the above-described situation. It creates conditions for just-in-time provision of BMs with the required quality and quantity [5]. This points out that building materials management should be paid special attention during all phases of the construction process [11]. In addition, a special attention should be paid to partnering in projects and supply chain integration [12]. In this context, a survey of [13] points out that the number of agreements for collaboration among clients, suppliers and contractors are significant in the construction industry. Also, by adequately managed coordination of their performance on individual and group level can be increased [14] which in turn will contribute to successfully performed construction project.

Given these facts, it can be concluded that the issues related to building materials supply management and all stakeholders involved in that process can have a considerable impact on the implementation of a construction project and on the satisfaction with the quality of structures.

This study is focused on management of human resources and quality in building materials supply process. It was examined: a) how communication and coordination among stakeholders in the building materials supply process were managed, and b) the way quality control of materials was administered. The examination was based on the construction project participants' assessments of these issues. Satisfaction with the quality of structures among construction professionals was also investigated.

## 2. Literature review

### 2.1 *Managing people through coordination and communication and managing quality of building materials in the supply process*

It has been observed that the temporary nature of the construction project together with the lack of commitment for sharing and communication have led to poor coordination resulting in conflicts and disputes [15]. Al Nady et al. [16] have even proven that communication, together with the role of time and cost management has positive impact on the project and its management. So, effective communication can lead to quick response/attention

on emerged problem during production work on construction site [17]. This also refers to the management of BMs. Having in mind that the high level of coordination in BMs supply is a challenge for construction project participants and key factor for improving the performance of the supply chain [12], good coordination and communication between project participants is of essential importance [5]. Effective coordination and communication can be achieved through adoption of information and communication technologies enabling real time communication flow [18]. The process of BMs management can be improved by involving all project participants and adopting usage of various solutions, such as wireless system, bar-coding, radio frequency identification [19], internet, GPS, tracking technology and extranet [5]. These technologies should be supported by optimal route scheduling [20]. Since internet provides an efficient platform for construction supply chain coordination, [12] present types of coordination mechanisms which are internet-enabled and can be applied. Thus, the need for ICT implementations in construction projects in order to manage interactions among contractors and suppliers [17], as well as to manage the materials and inventory throughout the construction activities and processes [8] is obvious as argued by [19]. Special attention should be paid to the logistics of material resources at urban construction sites, since quantity and weight of massive BMs and their handling on narrow and small parcels require more careful organization [21]. Other similar studies report on the impact of an efficient material management on small and middle enterprises (SMEs) on the construction sites. The study by [5], for instance, describes how SMEs can improve their performance in material management.

Additionally, projects, in their essence, are unique and associated with a certain level of uncertainty and the unknown [22]. It is therefore evident that their success, in terms of meeting the outlined objectives, will also be dependent on the extent of experience and skills that project participants have. The results of a study on project management competency [23], which assessed the importance of primary knowledge and skills, have revealed that planning, scheduling, leadership, delegation, negotiation, presentation and chairing meetings were ranked among the most important. However, the extent of knowledge and skills a project participant acquires in the process is dependent on many factors such as length of work tenure and level of education. These aspects have not been studied extensively for construction projects. For instance, Brière et al. [24] pointed out that it might be interesting to analyse certain variables pertaining to project manager profiles such as gender, age or education.

There is a limited literature available on this topic as noted in [25]. Their study on project management training and education has pointed out that when new engineers or managers join the group, it is questionable whether they don't know or whether they have forgotten, but the needed things should be repeated. Therefore, different expectations and perception of various aspects should be assumed among new and inexperienced staff. On the one hand, young team members are more supportive to innovation. On the other hand, when the project complexity increases (e.g. the project is a breakthrough or the input is not clear), project solutions become more dependent on experience or instinct of its group members who are staff with longer tenure [26]. Furthermore, human resources may also play important role in ICT adoption in BMs management [27]. Each project participant is only interested in own BMs supply issues. As a consequence, non-productive actions at construction sites are results of insufficiently planned and non-coordinated logistic processes [9].

## ***2.2. Project participants' satisfaction with the quality of structures***

Project participants' satisfaction with the quality of structures could be seen as a subjective indicator of the quality of the completed construction project. However, current research predominantly focuses on customer satisfaction. In construction, to ensure that structure meets the consumers' wishes, needs and expectations, the perceptions and the behavior of customers should be understood. For instance, Gunning [28] presented models which can be used to determine the level of customer satisfaction with the services provided within the construction industry. Kärnä et al. [29] revealed that customers are typically satisfied with the contractors' cooperation abilities and the skills of contractors' workers and supervisors. Regarding the material and quality assurance and handover procedures, their findings indicated a low level of satisfaction.

The project manager's level of satisfaction in construction logistics has also been studied by [30]. In relation to BMs, they pointed out that coordinated materials supply management contributes to gaining satisfaction for both the customers and the construction company.

It is obvious that the resulting quality of the structure should correspond to the price. In this relation, Yeung et al. [30] stated that the relationship between the customer expenditure and their satisfaction is significant. From this perspective, suggestions for the improvement of the econometric analysis of the relationship between price and quality are given by [31].

## ***2.3 Literature overview***

The literature review has shown that coordination and communication plays a significant role in the building materials supply process. It has also suggested that human resource management within the group of construction project participants is important. Both aspects refer to relevant risk sources in construction projects [32].

Considering the fact that there is just a limited literature available on the aspects of human resource management and their relation to the BMs supply process and the satisfaction with the quality of structures among project participants, this research is intended to bridge this gap and contribute to current body of knowledge by helping to understand the interactions among the above-mentioned aspects of a construction project.

Taking into consideration that a) construction professionals with higher education are mostly employees with larger number of job responsibilities, b) they are involved in decision making processes, c) they are continuously present on construction sites, and d) they are, ultimately, accountable for open communication, coordination, consultation, on-time delivery of the materials and materials quality control practices, it could be expected that they would tend to assess these aspects more positively. The same could be concluded for their satisfaction with the quality of structures. On the one hand, workers with shorter work tenure are more enthusiastic about the work and the work environment, but on the other hand, due to their lack of experience, they probably do not have clear criteria for quality management of the construction materials supply chain process. Therefore, it could be postulated that they might be perceived in a more positive manner. Nevertheless, when education and working experience are taken together, it could be expected that their role in the evaluation of both aspects of building materials supply process would be different.

Therefore, it was hypothesised that:

H1: Construction project participants with higher education a) will perceive coordination and communication and quality control in the building materials supply process more positively, and b) will be more satisfied with the quality of the structures in comparison to construction project participants with secondary education (main effect of the participants' level of education).

H2: Participants in a construction project with shorter work tenure a) will perceive coordination and communication and quality control in the building materials supply process more positively, and b) will be more satisfied with the quality of the structures than their counterparts with longer work tenure (main effect of the participants' work tenure).

H3: There is statistically significant interaction effect of construction professionals' level of education and work tenure on their assessment of a) the coordination and communication, as well as materials quality control in the building supply process, and b) the satisfaction with the quality of structures.

### 3. Methodology

#### 3.1 Sample and procedure

The sample consisted of 146 participants in construction projects in the Republic of Macedonia. An outline of their main features such as the role they undertake in construction projects, their gender, their level of education and their work tenure is presented in Table 1.

Table 1. Sample structure by construction project role, gender, level of education and work tenure

Characteristics	Frequency	Percent
<b>Project participants' role</b>		
<i>Materials Supplier</i>	8	5.5
<i>Contractor</i>	30	20.5
<i>Designer</i>	26	17.8
<i>Supervisor</i>	16	11.0
<i>Investor</i>	25	17.1
<i>Material procurement personnel</i>	20	13.7
<i>Other: storage assistant, materials sellers</i>	21	14.4
<b>Gender</b>		
<i>Females</i>	43	29.5
<i>Males</i>	86	58.9
<i>No answer</i>	17	11.6
<b>Level of education</b>		
<i>Secondary school</i>	58	39.7
<i>Higher education</i>	88	60.3
<b>Work tenure</b>		
<i>Up to 5 years</i>	50	34.2
<i>More than 5 years</i>	96	65.8

The data were collected in construction firms where study participants were employed. The completion of the questionnaire took 15 minutes. Prior to questionnaire distribution, the respondents were informed that the participation in the study was on voluntary basis, and that the responses would remain confidential and would only be used for research purposes.

#### 3.2 Measures

A questionnaire developed for the purposes of this study was used to assess the building materials supply management process and the satisfaction with the quality of structures among participants with

different roles and working experience in construction projects. The statements in the questionnaire were divided into three sections.

The first section consisted of ten statements. In this section, there were four items related to the perceived coordination and communication among the parties involved in the materials supply chain (e.g. "Activities at the construction site and the supply of the materials are well coordinated"). The remaining six items measured the perceived quality control of the materials delivered to the construction site (e.g. "Delivered building materials have a quality certificate"). Answers were given on a five-point Likert scale (1=completely disagree, 5=completely agree). Higher score indicated a higher level of perceived coordination and communication in the supply process as well as a higher degree of perceived materials quality control. The Cronbach's alpha reliability of the scale was 0.70.

The second section of the questionnaire was represented by one item used to assess the satisfaction of the project participants with the quality of the structures on a scale from 1–5 where 1=completely dissatisfied and 5=completely satisfied (e.g. "Indicate to what degree you are generally satisfied with the quality of the structures built"). A higher obtained score denoted higher level of satisfaction with the quality of structures.

Questions about demographic characteristics (gender, education, working experience and role in the construction project) were organized in the third part of the questionnaire.

The respondents were divided into two groups according to their level of education: group 1 included respondents with primary and secondary education, and group 2 included those with a university degree.

They were also divided into further two groups on the basis of their work tenure: up to 5 years (group 1) and longer than 5 years (group 2). Five years were taken as a cut score because remaining in one career or professional field for more than 5 years is considered to be a relatively long and stable working position experience in comparison to a period shorter than 5 years.

#### 3.3 Statistical analysis

Three separate two-way ANOVA's were used for data analysis (each for the assessed coordination and communication among stakeholders in the materials supply process, the perceived material quality control and satisfaction with the quality of structures as dependent variables and the level of education of the participants in the construction project and the duration of their working experience as independent variables).

**4. Results**

Table 2. shows that the mean of the assessed coordination and communication in the materials supply process (M=3.12; SD=0.67) and the evaluated materials quality control (M=3.16; SD=0.71) were relatively close to the midpoint of the measurement scale (from 1 to 5). In other words, both the management of coordination and communication

among the stakeholders in the building materials supply process and the quality control of the materials were evaluated as average. The obtained mean of the satisfaction with the quality of structures (M=2.71; SD=0.89) was lower than the midpoint of the scale (from 1 to 5). It can be concluded that the satisfaction of the surveyed participants in the construction projects with the quality of structures was lower than average.

Table 2. Summary of applied two-way ANOVA

Level of education	Working experience (in years)	Perceived coordination and communication in materials supply process			Perceived building materials quality control			Satisfaction with the quality of the structures		
		N	M	SD	N	M	SD	N	M	SD
Primary education and secondary education	Up to 5 years	19	3.18	.61	19	3.46	.35	19	3.00	1.0
	More than 5 years	39	2.95	.62	39	2.88	.76	39	2.51	.85
	Total	58	3.03	.62	58	3.07	.71	58	2.67	.92
University degree	Up to 5 years	31	3.32	.69	31	3.52	.74	31	2.65	.80
	More than 5 years	57	3.10	.54	57	3.05	.65	57	2.79	.90
	Total	88	3.18	.61	88	3.22	.72	88	2.74	.86
Total	Up to 5 years	50	3.27	.66	50	3.49	.62	50	2.78	.89
	More than 5 years	96	3.04	.58	96	2.99	.70	96	2.68	.89
	Total	146	3.12	.61	146	3.16	.71	146	2.71	.89

**Two-way ANOVA results**

The two-way ANOVA showed that the interaction effect of the respondents' level of education and their work experience on the assessed coordination and communication in the materials supply process and on the assessed materials quality control was not statistically significant (F(1, 142)=0.001, p>.05 and F(1,142)=0.21, p>.05 respectively). Only the interaction effect of the two study variables on satisfaction with the quality of structures was statistically significant (F(1, 142)=4.01, p<.05, η<sup>2</sup>=.027). Hypothesis 3 was thus partially confirmed.

Regardless of their educational background, the participants in the construction projects assessed both aspects of the building materials supply process in a similar manner on average and were relatively dissatisfied with the quality of structures (main effect of level of education; F(1, 142)=1.71, p>.05; F(1, 142)=0.91; p>.05 and F(1, 142)=0.06, p>.05). On account of the results, it may be stated that Hypothesis 1 was not confirmed.

The main effect of work experience on the perceived coordination and communication among stakeholders and assessed materials quality control in the supply process was statistically significant (F(1, 142)=4.30, p<.05, η<sup>2</sup>=.029 and F(1, 142)=18.21, p<.001, η<sup>2</sup>=.114). According to the respondents with work experience of more than 5 years, coordination

and communication among the involved stakeholders was managed at a slightly lower level compared to the respondents with work experience of up to 5 years (M1=3.04 vs. M2=3.27). Study participants with longer work experience assessed materials quality control as relatively low in comparison to their colleagues with work experience of up to 5 years (M1=2.98 vs. M2=3.49). It was found that participants with various duration of work experience did not differ in their satisfaction with the quality of structures F(1, 142)=1.18, p>.05). Therefore, Hypothesis 2 was partially confirmed.

**5. Discussion**

Building materials are necessary for any construction structure. The completion of building projects on time and within the planned budget depends upon the required materials. Therefore, a timely supply of materials of the requested quality and quantity creates the conditions necessary to follow the schedule and meeting the project deadline.

The building materials supply management is influenced by many factors that affect the time and costs of the given project and also the quality of the

work performed. In addition, each construction project is unique. This uniqueness has a direct influence on the process of materials supply management; it requires a special effort to understand the problems of each project, to find solutions for overcoming them and to implement the project successfully. Therefore, this survey was conducted to examine two aspects of the building materials supply management: a) coordination and communication among the parties involved in this process, and b) materials quality control, as well as the satisfaction with the quality of structures from the perspective of the project participants with different roles and working experience in the construction sector in the Republic of Macedonia.

The findings of this research are consistent with the study conducted in the UK construction sector [33] indicating that most of the participants in construction projects assessed the coordination and communication in the materials supply process and the control of the quality of the delivered materials as average. Another recent study conducted in the Macedonian construction sector [34] revealed similar results. This implies that the attention should be focused on improving the coordination and communication among project participants. In line with the suggestions given by many scholars (e.g. [35], [36]), ICT implementation should be considered as a valuable step to enhance the building materials supply process, particularly the coordination and communication among the parties involved in the supply chain. Furthermore, power and specific influence strategies should be used in order to manage supply chain networks, as argued by Belaya and Hanf [37].

It was found that the project participants are dissatisfied with the quality of structures. In line with this finding, special attention should be given to this aspect as it is regarded as one of the key elements for a) achieving better quality of structures, b) minimising construction costs and delays, and c) increasing the satisfaction of project participants with the performed work. Similarly, Kärnä [29] and Yeung et al. [38] reported low satisfaction among customers with the quality of the buildings. It can be concluded that the performance of construction projects should be on a higher level.

The findings also indicate that the project participants, regardless of their role, perceived the coordination and communication in building materials supply management process and materials quality control in a similar way. Respondents with working experience of more than 5 years perceived these aspects as relatively lower compared to their colleagues with working experience of up to 5 years who gave them higher scores. It seems that more experienced construction project participants are

more aware of the negative aspects of the materials supply process compared to their less experienced colleagues.

The interaction effect of the participants' role in the construction project and their working experience on both aspects of the building materials supply process was not significant. However, their role in the construction projects and their work experience together had, as was found, significant effect on the satisfaction with the quality of structures. Each construction project requires an effort to investigate the materials management process in order to ensure that the correct quality and quantity of materials are available when required. In addition, management of human resources in materials supply is another important aspect of this process. It appears that including the customers in this process could be beneficial as well.

## 6. Conclusion

The research results revealed that both coordination and communication among the involved parties, as well as, control of the quality of the building materials in the construction projects are at a satisfactory level. In particular, the low degree of satisfaction with the quality of structures should be emphasized. Consequently, the integration of all the parties in the materials supply management process is required in order to establish conditions in which the defined deadlines can be met and the contracted projects can be finished on time.

The findings also call for an examination of the satisfaction with the quality of structures from various aspects. The reasons for the low levels of satisfaction should also be explored.

The authors believe that this paper contributes to the general body of knowledge in the area of human resource management, the quality of building materials in the supply chain process, and the overall satisfaction with the quality of structures in construction projects. The results of this empirical study represent the basis for additional research in the respective areas within the construction industry.

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## References

- [1]. Mbachu, J., & Nkado, R. (2006). Conceptual framework for assessment of client needs and satisfaction in the building development process. *Construction Management and Economics*, 24, 31–44.
- [2]. Sarkar, A. (2007). Quality management in concrete construction. *The Indian Concrete Journal*, 38-41. [http://icjonline.com/views/pov\\_alok\\_sarkar.pdf](http://icjonline.com/views/pov_alok_sarkar.pdf)
- [3]. Lützkendorf, T., & Speer, M.T. (2005). Alleviating asymmetric information in property markets: building performance and product quality as signals for consumers. *Building Research & Information*, 33( 2), 182-195.
- [4]. Sobotka, A., & Czarnigowska, A. & Stefaniak, K. (2005). Logistics of construction projects. *Foundations of civil and environmental engineering*, 6, 203-216.
- [5]. Donyavi, S., & Flanagan, R. (2009). The impact of effective material management on construction site performance for small and medium sized construction enterprises. In: *Proceedings of the 25th Annual ARCOM Conference*, September 2009, Nottingham, UK, Association of Researchers in Construction Management, 11-20.
- [6]. Wang, F., & Wang, S. (2010). Applying logistics to construction material purchasing and inventory. In: *Proceedings - 2010 International Conference on System Science, Engineering Design and Manufacturing Informatization*, ICSEM 2010, 199-201.
- [7]. Abdul-Malak, M.A.U., & Abboud, N.E. & Chehab, G.R. (2000). Purchasing and payment policies for building construction materials. In: *Proceedings of Construction Congress VI: Building Together for a Better Tomorrow in an Increasingly Complex World*, 574-583.
- [8]. Kasim, N., & Liwan, R.S., & Shamsuddin, A., & Zainal, R., & Kamaruddin, C.N. (2012). Improving on-site materials tracking for inventory management in construction projects. In: *Proceedings International Conference of Technology Management, Business and Entrepreneurship (ICTMBE2012)*, Malaysia, 447-452.
- [9]. Voigtmann, J., & Bargstädt, H.J. (2010). Construction logistics planning by simulation. In: *Proceedings of the 2010 Winter Simulation Conference*, 3201-3211.
- [10]. Ren, Y., & Skibniewski, M.J., & Jiang, S. (2012). Building information modelling integrated with electronic commerce material procurement and supplier performance management system. *Journal of Civil Engineering and Management*, 18 (5), 642-654.
- [11]. Kasim, N., & Latiffi, A.A., & Fathi, S.M. (2013). RFID Technology for materials management in construction projects – A Review. *International Journal of Construction Engineering and Management*, doi:10.5923/s.ijcem.201309.02.
- [12]. Xue, X., & Wang, Y., & Shen, Q., & Yu, X. (2007). Coordination mechanisms for construction supply chain management in the Internet environment. *International Journal of Project Management*, 25, 150–157.
- [13]. Akintoye, A., & McIntosh, G., & Fitzgerald, E. (2000). A survey of supply chain collaboration and management in the UK construction industry. *European Journal of Purchasing & Supply Management*, 6, 159-168.
- [14]. Cutting-Decell, A.F., & Young, B.I, & Das, B.P., & Case, K., & Rahimifard, S., & Anumba C.J., & Bouchlaghem, D.M. (2007). A review of approaches to supply chain communications: from manufacturing to construction. *ITcom*, 12, 73-102.
- [15]. Tey, K.H., & Aminah, M.Y., & Syuhaida, I., & Lee, F.W. (2011). A conceptual study of key barriers in construction project coordination. In: *Creating Global Competitive Economies: A 360-Degree Approach, Proceedings of the 17th International Business Information Management Association Conference, IBIMA 2011*, 325-332.
- [16]. Al-Nady, BA-A., & Al-Hawary, S.I.S., & Alolayyan, M.N. (2016). The role of time, communication, and cost management on project management success: An empirical study on sample of construction projects customers in Makkah City, Kingdom of Saudi Arabia. *International Journal of Services and Operations Management*, 23(1), 76-112.
- [17]. Wikforss, Ö., & Löfgren, A. (2007). Rethinking communication in construction. *ITcon*, 12, 337-345
- [18]. Ahuja, V., & Yang, J., & Shankar, R. (2009). Study of ICT adoption for building project management in the Indian construction industry. *Automation in Construction*, 18 (4), 415-423.
- [19]. Kasim, N., & Latiffi, A.A., & Fathi, S.M. (2013). RFID Technology for materials management in construction projects – A Review. *International Journal of Construction Engineering and Management*, doi:10.5923/s.ijcem.201309.02.
- [20]. Klanšek, U. (2011). Using the TSP Solution for optimal route scheduling in construction management. *Organization, Technology & Management in Construction, An International Journal*, 3(1), 243-249.
- [21]. Španić, M., & Dolaček-Alduk, Z., & Špoljarić, J. (2010). Logistics of material resources at urban construction sites. In: *Conference proceedings of People, Buildings and Environment 2010*, An international scientific conference, Krtiny, Czech Republic, 299-304.
- [22]. Anantatmula, V.S. (2010). Project manager leadership role in improving project performance. *Engineering Management Journal*, 22(I), 13-22
- [23]. Edum-Fotwe, F.T., & McCaffer, R. (2000). Developing project management competency: Perspectives from the construction industry. *International Journal of Project Management*, 18(2), 111-124.

- [24]. Brière, S., & Proulx, D., & Flores, O.N. & Laporte, M. (2015). Competencies of project managers in international NGOs: Perceptions of practitioners. *International Journal of Project Management*, 33(1), 116-125.
- [25]. Ramazani, J., & Jergeas, G. (2015). Project managers and the journey from good to great: The benefits of investment in project management training and education. *International Journal of Project Management*, 33(1), 41-52
- [26]. Mihić, M., & Sertić, J., & Završki, I. (2014). Integrated project delivery as integration between solution development and solution implementation. *Procedia Social and Behavioral Sciences*, 119, 557–565.
- [27]. Mustapa, F.D., & Mustapa, M., & Misnan, M.S., & Mahmud, S.H. (2012). ICT adoption in materials management among construction firms in construction industry. In: *CHUSER 2012 - 2012 IEEE Colloquium on Humanities, Science and Engineering Research*, 342-346.
- [28]. Gunning, J.G. (2000). Models of customer satisfaction and service quality as research instruments in construction management. In: *Akintoye, A (Ed.), 16th Annual ARCOM Conference*, 6-8 September 2000, Glasgow, UK, Caledonian University. Association of Researchers in Construction Management, 1, 21-30.
- [29]. Kärnä, S. (2004). Analysing customer satisfaction and quality in construction – the case of public and private customers. *Nordic Journal of Surveying and Real Estate Research*, 2, 67-80.
- [30]. Jang, H., & Russell, S.J., & Yi, S.J. (2003). A project manager's level of satisfaction in construction logistics. *Canadian Journal of Civil Engineering*, doi:10.1139/103-068.
- [31]. Kristensen, K. (1984). Hedonic theory, marketing research, and the analysis of complex goods. *International Journal of Research in Marketing*, 1(1), 17–36.
- [32]. Dunović, B.I., & Radujković, M., & Vukomanović, M. (2013). Risk register development and implementation for construction projects. *Gradjevinar*, 65(1), 23-35.
- [33]. Memon, A.H. & Rahman, I.A. (2013). Analysis of cost overrun factors for small scale construction projects in Malaysia using PLS-SEM method. *Modern Applied Science*, 7(8), 78-88.
- [34]. Blaževska-Stoilkovska, B., & Hanák, T., & Žileska-Pančovska, V. (2015). Materials supply management in construction projects and satisfaction with the quality of structures. *Tehnički vjesnik – Technical Gazette (TV-TG)*, 22(3), 721-727.
- [35]. Gunasekaran, A., & Ngai, E.W.T. (2004). Information systems in supply chain integration and management. *European Journal of Operational Research*, doi:10.1016/j.ejor.2003.08.016
- [36]. Kasim, N. (2011). ICT implementation for materials management in construction projects: case studies. *Journal of Construction Engineering and Project Management*, 1(1), 31-36.
- [37]. Belaya, V., & Hanf, H.J. (2014). Power and influence in Russian agri-food supply chains: results of a survey of local subsidiaries of multinational enterprises. *Journal for East European Management Studies*, 19(2), 160-184.
- [38]. Yeung, H.C.M., & Ramasamy, B., & Chen, J., & Paliwoda, S. (2013). Customer satisfaction and consumer expenditure in selected European countries. *International Journal of Research in Marketing*, 30(4), 406–416.