



Opponent's review of the Doctoral Thesis

Candidate Sonia Salim Ahmed

Title of the doctoral thesis Innovation of building processes in Syria by using BIM

Branch of study Civil Engineering

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Topicality of the doctoral thesis theme

Commentary: The dissertation is devoted to the analysis of the perceptions of the Syrian industry about the benefits of BIM (Building Information Modelling) technology and challenges facing the implementation of BIM. The work of Sonia Ahmed is applied to the newest and most advanced digital technology in the construction industry. This is an important and up-to-date topic study important and actual not only for Syria but also other Arab and developing countries. Sonia Ahmed participates to the first BIMarabia e-magazine in this area as the co-manager what makes the dissertation even more embedded in the practical applications and the realities of the Arab world. The topic of the thesis is actual and relevant in the context of up-to-date research in ways of building reconstruction in the post-disaster/post-war with the implementation of BIM technology.

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Fulfilment of the doctoral thesis objectives

Commentary: The main thesis objective is improving the Syrian construction industry performance spreading awareness of BIM and its concepts implementation. It should be noted here that this problem concerns a very unusual and difficult situation in which this country is currently landed. Conclusions from this dissertation can, therefore, be used in other similar crisis situations such as war conflicts or natural disasters. The author has sufficiently presented her work related to the dissertation. The dissertation fulfills its objectives, brings new findings and is applicable for future research and development of BIM technology in post-disaster/post-war situations. It proves also the expert abilities of the candidate.

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Research methods and procedures

Commentary: The methodology of the research was divided into two parts: theoretical and practical. In theoretical the current state of the construction industry and BIM technology development was presented. It was done with the respect of the complexity of the construction processes which are very difficult to manage. In this review of the literature, construction problems in the Arab countries, especially in Syria, were more strongly emphasized.

In practical, the research methods rely on three pillars: cooperation, questionnaire, and the modeling. Thanks to cooperation it was possible to obtain all necessary information, and feedback from practice in Syria what was very crucial for the rest of the research. The electronic survey formula (open and closed) designed with the help of interviews gave satisfactory results regarding the implementation of BIM technology in the Arab countries (excluding Dubai and

Qatar) and with particular emphasis on the most damaged country which is currently Syria. Also, cooperation with architects, constructors, and MEP engineers has resulted in the creation of BIM models of a residential building in Syria.

Generally, research methods are clearly described. All used methods and procedures of research work are up-to-date and appropriate to the aims.

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Results of the doctoral thesis – dissertant’s concrete achievements

Commentary: The results presented in this thesis are interesting and practically usable for researchers and practitioners worldwide, which is exemplified by the numerous publications of the author on various international conferences. It should also mention the managing by Sonia Ahmed www.BIMarabia.com information portal, which is conducted in the Arabic language and potentially it could have a big impact on the countries of the Middle East. Unfortunately, this fact is difficult to evaluate by the reviewer, however, the English version of this website is very professional and indicates a high level of knowledge in the field of construction and BIM technology. Very interesting are the conclusions regarding the situation of the construction market in Syria, which is currently in a catastrophic situation related to the ongoing civil war as well as in other Arab countries affected by various crises providing to the degradation of infrastructure.

A significant achievement was also conducting a survey regarding the needs of the construction industry and the state of implementation of BIM technology in the Middle East, in which nearly 100 participants took part.

A difficult issue was the assessment of the selected organization BIM maturity. Usually, it is applied to administrative units, design offices, and main contractors or subcontractors. The author conducted a case study, which analyzed the resources and potential in this area in the Syrian General Company of Engineering Studies and Consulting. Both the procedure and presentation of the results were done in a professional manner.

The author also performed in cooperation with other multi-branch designers (architectural, structural, MEP) and multidimensional aspects (3D geometry, 4D schedule, 5D costs) BIM residential complex model in the Revit environment. She showed in this way that she can work with an interdisciplinary team and coordinate the tasks of designers by integrating different models and searching for any collisions. She also simulated the whole life cycle of the building from the planning phase, through designing details, construction, maintenance up to final demolition.

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Importance for practice and for development within a branch of science

Commentary: The dissertation shows the analysis of the construction market in developing countries against the background of the richest countries and in the context of the industrial revolution which in this case is primarily associated with the digitization and implementation of BIM technology. These are very unique studies containing interesting conclusions that can be used by decision-makers in crisis countries, but also by global technology and BIM service providers. Several dozen Syrian construction projects have been studied for this purpose. Mainly in terms of the reasons for their delays and budget overruns. We can also see that the author is aware of the processes and changes that will soon affect the construction industry. She also knows the characteristics of Arab countries very well and is able to properly use the advantages of BIM in this specific situation.

A selected and well-implemented case study containing the BIM maturity assessment in one of the largest Syrian construction companies can be applied as a good example. The results of the dissertation can be used for further development of a set of measures to improve the working environment, performance and effective communication between project parties in various stages of the building lifecycle.

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Formal layout of the doctoral thesis and the level of language used

Commentary: The doctoral dissertation (192 pages long) is written in English. It is structured in six parts with two appendixes. The first part is dedicated to the problem definition with thesis objective and used methodology.

In general, the text is written in very good English, contains only a few mistakes, typos, or missing articles, and is very easy to read. The main point of each paragraph is always very clear, the concepts, ideas, and results presented in the text are nicely documented by the figures and tables. The only problem is that the majority of figures do not have references in the text.

excellent above average average below average poor

Remarks

Despite relatively positive results achieved by the candidate in the thesis, there appeared some mistakes and weaker parts which should be explained. My remarks to this are following:
No drawing (except no. 15, 16, 17, 45) has a comment in the text, what makes it difficult to link the discussed issues with a graphic interpretation or to understand the meaning of the created schemes, models or graphs.
In the opinion of the reviewer, too much attention has been devoted to the definition of innovation. It is currently one of the most used words in the European Union, which has become a simple way to increase the importance of the research results of many scientific teams. From the entire third chapter about innovation, the most interesting is the approach to innovation in Syria which is currently in a state of many years civil war.
In addition, two questions were raised during the study of the dissertation, which has not been discussed extensively.
What is the role of OpenBIM philosophy in Arab countries?
Which contracts from the most frequently implemented best suit BIM technology? Design-Bid-Build or Design-Build?

Final assessment of the doctoral thesis

The doctoral dissertation is well structured and well written even if the state of the art could have been more developed. It contains a small number of typing errors, mistakes, and inaccuracies but they do not lower the quality of the document.

Although it does not matter for the scientific evaluation of work, I am personally impressed by the professionalism and commitment of Sonia Ahmed activities that, not only in her opinion, may give a chance to accelerate the reconstruction of the country from tragic destruction. They can also give millions of people who have lost their homes, hope for new life and safety. It would be great if some other digital technology like BIM could contribute to improving the situation in Syria. I also admire the patriotism and inner conviction of Sonia Ahmed that the knowledge and experience gained from studying in Europe can give something valuable to her country. Especially the experiences from Central Europe, which also dealt with the atrocities of war and communism. Finally, I can state that Sonia Ahmed has demonstrated that she masters scientific methods and current techniques of BIM technology and construction project management. The doctoral dissertation fulfills the conditions of an independent creative scientific research and contains original results published by the author at an appropriate level in international journals and conferences. In my opinion, the thesis clearly meets the standard generally required for the awarding of the doctoral degree. Therefore, I recommend the submitted doctoral dissertation for defense.

Following a successful defence of the doctoral thesis I recommend the granting of the Ph.D. degree

yes no

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Opponent's signature: