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REVIEW OF THE DOCTORAL DISSERTATION

The author of the dissertation:	Aref Shayganmehr
Author's affiliation:	University of Warsaw
The title of the Ph.D. dissertation:	New technology adoption of Internet of Things in Iranian Healthcare centers
Dissertation written under the supervision of:	Dr hab Mariusz Trojanowski, prof University of Warsaw, Faculty of Management Marketing Department Dr Gholamreza Malekzadeh, Ferdowsi University of Mashhad, Faculty of Economic & Administrative Sciences

Introduction

The review was commissioned by the University of Warsaw, in accordance with the Resolution of the Scientific Discipline Council - Management and Quality Sciences of 02/03/2022. The thesis was written at the Faculty of Management. Dissertation was written under the supervision of **Dr hab Mariusz Trojanowski, prof University of Warsaw, Faculty of Management Marketing Department and Dr Gholamreza Malekzadeh, Ferdowsi University of Mashhad, Faculty of Economic & Administrative Sciences Faculty of Economic & Administrative Sciences**. This review was prepared on the basis of a letter dated 8th March 2022, from the Chairman of the Scientific Discipline Council - Management and Quality Sciences, prof. dr hab. Grzegorz Karasiewicz.

The dissertation is a wide work of 199 pages, 159 pages are the main text supplemented with bibliography and attachments. This thesis submitted for review includes an introduction, three chapters, ethical considerations and references. The dissertation is enriched by tables - 26 tables and a list of figures - 22 figures. The appendix are: 1) UTAUT2 questionnaire for physician acceptance, 2) Interview Protocol, 3) Modified UTAUT2 questionnaire, 4) Research Ethics Certificate. The doctoral dissertation was prepared in English, includes an abstract in Polish

The dissertation used a very extensive, satisfactory range of source materials, including English literature. The list of literature may constitute an important source base for continuers of research in this field in other academic centers.

In accordance with statutory requirements of the Law on Higher Education and Science (Act of 20 July 2018), in Part V (Degrees and titles in the system of higher education and science, art 187) a PhD dissertation should demonstrates the candidate's general theoretical knowledge in a discipline and the ability to conduct research independently. The subject matter of the doctoral dissertation shall be an original solution to a scientific problem in the economic or social sphere. The doctoral dissertation may be a written dissertation, including a scientific monograph.

Taking these recommendations into considerations, the following evaluations were adopted for assessing **Aref Shayganmehr's** doctoral thesis:

- Original solution to the academic problem,

- Candidate's general theoretical knowledge on issues related to the discipline of Management and Quality Sciences,
- The Author's ability to conduct academic research,
- The dissertation's objective and research methodology and structure of the thesis.
- The author's ability to discussion, conclusion and giving a implications for research and future research suggestion.

The study provides in the theoretical perspective, some contribution that is different from work previously done by another authors and that distinctly is the product of the candidate's own thinking.

Evaluation of the choice of the dissertation subject and the original solution to the academic problem.

The topic selected by the author should be considered original and up-to-date in terms of research. The aspect of originality comes from trying to collect and organize information on a topic of a new technology adoption of Internet of Things in Iranian Healthcare centers.

This issue is extremely important from the point of view of the functioning of the health care system, and on the other hand, it is relatively poorly understood in the field of management and quality science. I believe that studies on such issues are needed, and their model approach makes them innovative. The advantage of the work is the analysis and postulates in the field of technology acceptance models.

Based on the literature review and analysis, the author identified the research gap, pointing to that many studies have indicated technology acceptance theory and proved it as an effective tool in predicting technology acceptance.

The main objective of the dissertation was supported by three research questions, research objectives and research hypothesis

I assess the research field adopted by the author as extensive, rich in important scientific and utilitarian problems.

Evaluation of the Candidate's general theoretical knowledge on issues related to the discipline of Management and Quality Sciences

The author found research gaps.

- 1) Adoption of Health IOT and EHR is challenging despite its benefits and it is international problem,
- 2) Technology adaption model (UTAUT2) need to be modified for more accurate and specific for different contexts such as electronic healthcare record,
- 3) There is a lake of studies on the adoption of the Internet of Things in healthcare systems and EHRs systems,
- 4) Most studies have been quantitative and hypothetical and qualitative study is important to discover more factors and deeper investigation

The main research problem of this study was to understanding health care technology Adaption while considering the: (1) Acceptance of Health network that connects various objects to humans with the help of communication and wireless technology; (2) Discover effective factors in EHR acceptance and modified UTAUT2 model for more accurate and specific for electronic healthcare record; (3) Test new modified model.

The main hypothesis:

- Hypothesis 1: Performance expectations (PE) have a positive effect on the behavior of the intention to take IOHT.
- Hypothesis 2: Waiting for effort (EF) has a positive effect on preserving the intention to take IOHT.
- Hypothesis 3: Facilitating conditions (FC) have a positive effect on the intent to take IOHT.
- Hypothesis 4: Price value (PV) has a positive effect on the behavior intention to adopt IOHT.
- Hypothesis 5: Habit have a positive effect on the behavior intention to adopt IOHT.
- Hypothesis 6: waiting times have a positive effect on the behavior intention to adopt IOHT.
- Hypothesis 7: Authority have a negative effect on the behavior intention to adopt IOHT.
- Hypothesis 8: Trust and Confidentiality have a positive effect on the behavior intention to adopt IOHT.
- Hypothesis 9: Physician-Patient Relationship have a negative effect on the behavior intention to adopt IOHT.

Assessment of the structure of the dissertation

The dissertation consists mainly of the introduction, three chapters, summary, bibliography, attachments in the form of questionnaires and lists: tables and figures. The chapters have a variable volume, but are structured correctly. The concept of the work is consistent, it indicates important scientific and practical problems, giving the author a chance to demonstrate erudition and knowledge of the issues presented.

The work has a strong theoretical and practical basis. The author based his conclusions on the results of literature studies and his own empirical research. Individual issues were discussed theoretically and then (in the empirical part of the work) verified on the basis of the results of own research. The first chapter presents an overview of the extant literature on technology adaption theories. The second chapter outlines the research. This thesis was conducted in three stages. First study aimed to investigate factors affecting the acceptance of IoT technology in the Iranian health system using the UTAUT2 model. In the third chapter empirical results are described and discussed.

The aim of this study is to thoroughly understand the determinants of health, in particular electronic medical records, and to modify the current UTAUT2 model for the health care system in order to adapt this model to the characteristics of the health care system. This thesis goes further, however, as it emphasizes the importance of nine factors as a determinant in adopting the electronic register of medical information, and the identified dimensions were confirmed by the quantitative method (0.84, $p < 0.001$). Therefore, the dimensions of the extraction are as follows:

1. Performance expectation (PE)
2. Effort expectation
3. Facilitating Conditions (FC)
4. Price value
5. Habit
6. Waiting time
7. Authority
8. Trust and confidentiality
9. Health Provider-Patient Relationship (emotional communication and empathy)

The author points out that future research could consider examining the acceptance of other IoT technologies such as big data, augmented reality and cognitive systems. Policies and regulations in the healthcare sector are very important and may have an impact on the induced demand for technology in the health market, which should be considered in future research, therefore it is suggested that the role of induced demand in technology acceptance should be the subject of further research. The author suggests that the importance of paying attention to the role of emotions and feelings in technology design should be analyzed in separate studies.

Substantive assessment

The proposed layout of the dissertation and the interpenetration of theoretical and research issues directly affect the substantive assessment of the dissertation. The author showed knowledge of the issues, was able to pay attention to the nodal problems and their impact on the analyzed processes, which gave rise to inference. As a result, the work shows the complexity and multidimensionality of the examined factors. The specificity of the problem was first recognized and diagnosed on the basis of literature studies, and then empirically verified with the use of appropriately selected analytical instruments.

In the work, the author pointed to the essence of a mixed approach in research. Most of the research was based on quantitative research and there was a need for qualitative research to develop a deeper understanding of a specific phenomenon. The use of interviews and focus groups as a qualitative approach was useful and appropriate for modifying the UTAUT2 model, studying adoption factors and generating four new constructs. Ultimately, the author used quantitative research to test and validate the obtained factors.

Questions:

- 1. After analyzing the author's interesting research, the question arises: will the technology, which is unstoppable (and its implementation depends on time), not cause permanent changes in the doctor-patient relationship. And if yes, then how to improve and streamline communication.**
- 2. Did the pandemic accelerate the possibility of implementing technological solutions, were the barriers broken, and if so, what were they?**

Opinion on the author's own contribution to the development of science

The work has the features of originality, resulting from the topic of the dissertation and the analysis of phenomena. The presented dissertation is of an interdisciplinary nature. The presented content combines the issues of economics and management and quality sciences, but also other social sciences (law), and relate to issues of medical sciences.

Conclusion

When making a comprehensive assessment of the content of the dissertation, it should be recognized that the thesis is a scientific and research contribution in the presented area. The author presented a broad and in-depth knowledge of the issues presented. Theoretical themes are illustrated by empirical issues. The work is prepared carefully and clearly. The linguistic message does not raise any objections. The author's research maturity is reflected in the awareness and perception of the limitations that have appeared in the research process.

The reviewed dissertation presents a scientific problem and the way to solve it. The content proves the great knowledge and diligence of the author. The presented argument is of a scientific nature and gave the author a chance to demonstrate a good scientific technique and contribution to science.

Summing up, I assess positively:

- an original solution to an academic problem,
- general theoretical knowledge of the candidate in the field of issues related to the discipline of Management and Quality Sciences,
- the author's ability to conduct scientific research,
- the aim of the work, research methodology and work structure,
- the ability of the author to discuss, conclude, and make implications for research and make suggestions for future research.

Considering the above, I state unequivocally that the dissertation presented by Mr. **Aref Shayganmehr** meets the requirements of the Act of March 14, 2003 on academic degrees and academic title as well as on degrees and title in the field of art (Journal of Laws 2003 No. 65, item 595, as amended) in connection with Art. 179 of the Act of July 3, 2018 Introducing the Act - Law on Higher Education and Science (Journal of Laws of 2018, item 1669, as amended) and I am applying for its adoption and admission to public defense.

I wish the author not only success in the field of scientific advancement, but also I believe that the presented dissertation will be received with great interest and may be a contribution to further research and discussion in the subjective scope.



Monika Dobska

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