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## **REVIEW OF THE DOCTORAL THESIS**

**by Abdel-Rahman Fakhani MSc.  
entitled "A comparative research of urban mobility in Poland and Germany.  
On the behavior of different generations"  
prepared at the University of Gdańsk under the scientific supervision  
of Prof. UG, dr hab. Michał Suchanek**

### **Formal basis for the review**

The formal basis for the development of this review was the Resolution of the Discipline Council of Economics and Finance of the University of Gdańsk of February 23, 2023, presented in a letter addressed to me by the Chairman of the Discipline Council of Economics and Finance of the University of Gdańsk, Prof. UG, dr hab. Przemysław Borkowski.

The review assesses whether the conditions for doctoral dissertations, which result from the applicable provisions of law set out in the Act of 20 July 2018, the Law on Higher Education and Science (Journal of Laws of 2018, item 1668, as amended), have been fulfilled. The submitted dissertation was assessed based on the legal requirements outlined in the aforementioned legal basis. It included confirming the Ph.D. student's general theoretical knowledge in the leading discipline, as well as his ability to independently conduct scientific work and provide an original solution to a scientific problem by applying the results of his own research in the economic or social spheres.

## **1. The appropriacy and importance of the dissertation topic**

The title of the dissertation, i.e., “A comparative research of urban mobility in Poland and Germany. On the behavior of different generations”, was formulated correctly and was properly included in the structure and content of the work.

The author’s dissertation subject should be considered extremely appropriate. Urban mobility plays a strategic role in the transformation towards smart cities, able to address environmental challenges and adapt to new development conditions. These activities should take account of the need to balance social, economic, and environmental aspects, which are the three pillars of sustainable development. Meanwhile, urban areas, which are the living environment for the vast majority of the population, generate increasing social, economic and environmental losses.

As rightly noted by Abdel-Rahman Fakhani, MSc., the development of cities and the evolution of their inhabitants’ needs have increased the demand for individual means of transport. The consequence of this transformation is increasing disruption and congestion in the road network. Traffic jams in cities have a negative economic and social dimension, and they also have a negative impact on residents’ health, and they affect the natural environment. The basic environmental problems in cities are related to the use of petroleum-derived raw materials, such as fuel in transport, which causes, among other things, an increase in CO<sub>2</sub> emissions, air pollution, and noise. At the same time, although these problems have a local dimension, their effects are increasingly international, even global. They include climate change, an increase in diseases, and disruptions in logistics chains. Therefore, cities must improve their efforts to develop innovative and sustainable mobility. They involve implementing technological solutions, improving the organization of transport, and using the potential for behavioral changes regarding mobility in the city.

The Ph.D. student examined the development of sustainable mobility in cities, taking into account the various factors that influence it. Specifically, the study focused on transport behavior and how it differs across generations. The Reviewer considers it interesting to adopt the perspective of social and cultural changes in terms of shaping sustainable urban mobility. As Mr. Fakhani shows in the introduction to the dissertation, it is difficult to convince people to use public transport if, in the social awareness, a car is not only a means of transport but also an indicator of social status. To influence such a change, it may be necessary to use behavioral economics, which provides methods to help change habits and the way new solutions are perceived. At the same

time, the younger generation can help change people's thinking, as they have a different approach to mobility. It is increasingly perceived as a service rather than an indicator of social status.

In the Reviewer's opinion, after analyzing the literature on the subject, the Ph.D. student correctly recognized and identified the research gap. The scope of the dissertation is appropriately aligned with its title and subject matter, as it extensively covers all relevant issues required for a thorough analysis of the research topic. It fits into national and international research trends.

**In view of the above, in the Reviewer's opinion, the dissertation topic should be considered appropriate and fully justified. The subject of the dissertation is undoubtedly up-to-date and important from both theoretical and practical points of view.**

## **2. Assessment of the correctness of formulating the dissertation's objectives and research hypotheses**

The literature review and the identified research gap allowed the candidate to formulate the main objective of the dissertation. This goal was defined to compare the mobility behaviors between Generation X (Gen X), Generation Y (Gen Y) and Generation Z (Gen Z), and to identify commonalities and differences, as well as underlying behaviors (p. 11).

Based on the main objective of the work, the Ph.D. student formulated seven research questions (pp. 11-12):

1. What are the main factors influencing mobility behavior in daily commuting?
2. What is the living situation and how satisfied are the citizens with respect to the living environment?
3. What are the differences and trends in mobility behavior between the two cities in general?
4. What are the general differences and trends in mobility behavior between the generations?
5. What are the differences and trends in mobility behavior between the different generations within both cities of Warsaw and Berlin?
6. What are the differences and trends in the mobility behavior of the respective generations in a direct comparison between Warsaw and Berlin?
7. How do the trends in mobility behavior of different generations affect future planning for sustainable transportation infrastructure?

The aim of the dissertation and the research questions were formulated correctly and reflect the essential essence of the research topic. In addition, they are internally consistent and consistently implemented as part of the research process.

Abdel-Rahman Fakhani, MSc., proposed the following four research hypotheses (p. 12):

- H1: In Berlin, sustainable modes of transport are more developed than in Warsaw, which means that they are also used more frequently in comparison.
- H2: There is a trend that younger generations have a more environmentally conscious lifestyle and thus, exhibit more sustainable mobility behaviors.
- H3: The younger the generation, the more likely it is to use alternative modes of transport to the car, such as bicycles or mobility sharing offerings.
- H4: There is a general trend among all generations of a high willingness to use more sustainable transport modes if a sufficient mobility offering is provided.

The hypotheses are logical and verifiable in the research process. They were formulated correctly and are consistent with the research goal. The verification of these hypotheses was reflected during the empirical research, but also in the theoretical part of the work.

**In the Reviewer's opinion, the main objective, research questions, and hypotheses were formulated correctly, creating a coherent, logical whole.** After reading the content of the dissertation, it can be concluded that the answers to the research questions lead to the achievement of the main goal. The research hypotheses were verified in both the theoretical and empirical parts of the work, and they confirm Mr. Fakhani's analytical skills. **In conclusion, the results of the research can be considered mature and creative, attesting to his high scientific level.**

### **3. Evaluation of the applied research methods and techniques**

The methods, techniques, and research tools used were varied and appropriate to the main purpose of the work and the type of research conducted. In his dissertation, Mr. Fakhani used the triangulation of research methods and techniques appropriate for economic sciences. Qualitative research was supplemented with quantitative research, and the research was conducted in accordance with the diagnostic procedure.

The course of the research comprised three main stages. The first stage, the desk research, included a literature review using numerous data sources (including the Google Scholar, BazEkon, Scopus, and Web of Science databases), and a review of public statistics, selected legal acts and strategies, research reports, and reports. The literature is up-to-date, covering the last decade. Based on a critical and retrospective literature review, the candidate meticulously analyzed the source data, and the selection of items was appropriate to the subject. However, the lack of information regarding the procedure for analyzing the collected information constitutes a minor insufficiency. The author provides a list of keywords, which should be considered positive. However, it does not indicate how many results were consistent with the search algorithm, how they were further selected, or which were subjected to further analysis (and why). Therefore, the Reviewer asks the Ph.D. student to explain the assumptions and course of the literature review during the public defense.

The second stage, the qualitative research (2021), included the preparation of a research tool, the design and selection of a research sample, the implementation of questionnaire surveys using the CAWI (Computer-Assisted Web Interview) method in Warsaw and Berlin (May 25 to June 25, 2021), and the qualitative analysis of the data to authenticate the test results. Quantitative research is an important part of the research procedure. In the Reviewer's opinion, it was prepared and conducted with due diligence and maintained the assumptions made in the context of purposeful selection. The questionnaire was addressed to members of Gen X, Gen Y and Gen Z (respondents aged 18 to 56) living in Warsaw and Berlin. After verifying the results of the questionnaire survey, the final research sample consisted of 537 data records (246 for Warsaw and 291 for Berlin), which were analyzed. The prepared proprietary research tool demonstrates the high scientific level of the Ph.D. student. The majority of the closed questions were very complex, which I view as a sign of his research inquisitiveness and scientific maturity.

The third stage, the quantitative research (2021-2022), included a statistical analysis of the final set of empirical data. The multifaceted comparative analysis carried out at this stage of the study was in-depth, and the results are thoroughly and correctly discussed. I very positively perceive the appropriacy of the statistical tools used in the dissertation, both for describing the structure of the community and for evaluating the examined relationships.

**In light of the above content, the Reviewer states that the Ph.D. student has the ability to use various research methods. He used them in a manner appropriate to the analyzed material and with great research skill.**

#### **4. Assessment of the correctness of the structure and formal aspects of the dissertation**

In terms of structure and volume, the doctoral dissertation meets the standards adopted in economic sciences. The dissertation has 289 pages and includes an abstract (in Polish and English), an introduction, five chapters, conclusions, a bibliography, a list of 59 tables, a list of 29 graphs, and seven attachments: (A) details to basic figures and key mobility indicators, (B) survey questionnaire, (C) details of the variables, (D) details of the analysis from the multinomial logistic regression of the “daily commute” model, (E) details of the statistical results of the city comparison: Warsaw vs. Berlin, (F) details of the statistical results of the city comparison, (G) details of the statistical results of the generational comparison. The chapters are 43, 31, 17, 32 and 58 pages long. Thus, the structure of the work may raise reservations, mainly about the proportions of chapters 3 and 5. However, at the same time, the division of the content follows the implementation of the main goal, the questions posed and the research hypotheses. The volume of the fifth chapter, which is empirical, is a consequence of the research procedure, and the Reviewer does not raise any objections in this context. While the use of unnumbered and untitled text at the beginning of each chapter may be a stylistic choice, it does not provide a clear structure. Including chapter titles or numbering can help orient readers and enhance the overall coherence of the dissertation. In the Reviewer’s opinion, it would be advisable to include these fragments in the formal structure of the dissertation, for example, as an Introduction.

The dissertation has a theoretical and empirical character. The first three chapters present theoretical and factual analyses, the fourth describes the statistical characteristics and the methodology used, and the last chapter is empirical. The dissertation has been written in clear language and is refined in terms of editing, with a logical sequence of the presented arguments. He also showed efficiency in presenting the issues and correctness in terms of the conclusions drawn and the results interpreted. **The formal and technical side of the dissertation does not raise any**

**objections. Consequently, the reviewed dissertation is an appropriate and concise study of the topic.**

### **5. Assessment of the substantive content of the dissertation**

The content and structure of the introduction to the dissertation are conventional and correspond to requirements for doctoral theses. The doctoral student justified his choice of topic, pointed to the identified research gap, formulated the main goal, research questions and hypotheses, and described the subjective and spatial scope of the research, as well as the research methods and tools used. In addition, he characterized the content contained in individual chapters of the dissertation. However, in the Reviewer's opinion, the characteristics of the literature sources used were not presented; he only indicated that they constituted a framework for exploring research questions. That said, the Reviewer has no objections to the bibliographic resources. In addition, I positively assesses the concise and transparent nature of the introduction and considers it an appropriate introduction to the content of the dissertation.

The Reviewer appreciates the scope of the analysis undertaken in the theoretical part of the dissertation to build an appropriate foundation for the empirical research. The basic theoretical foundation of the dissertation is summarized in the considerations of chapters one, two and three. The student focused on explaining and conceptualizing the issues that constitute the main theoretical currents of the work. From the outset, he conducted a scientific discourse with great accuracy and precision based on an in-depth review of the subject literature, as exemplified by the in-depth review of the definition of sustainable smart cities, mobility and sustainable transport, transport behavior in the light of consumer behavior models, and the concept of generations in the light of mobility.

The first chapter focuses on urban mobility in a smart city in the light of the sustainable development paradigm. In addition to an extensive discussion of the definitions of this issue, it also highlights the context of the social and environmental responsibility of stakeholders in shaping urban mobility systems. The review of trends and their effects in terms of new methods of urban mobility and modern infrastructure is interesting and cognitively valuable. The candidate presents an interesting and multifaceted approach to the development of modern infrastructure, taking into account the requirements of sustainable development. In his considerations, he refers to the importance of sustainable transport infrastructure, but does not provide a definition of this concept.

He may have assumed that it is identified with the cited attributes of sustainable infrastructure. The outline of changes in a contemporary urban mobility system in terms of the recently observed forms of mobility in the sharing economy is noteworthy, as is the multidimensional analysis of the conditions for the development of the MaaS concept. At the same time, it is a pity that there are so few examples of cities or implemented projects, e.g., in Europe, where MaaS solutions function or are implemented.

The second chapter looks at consumer behavior in the context of transport behavior and factors that shape consumers' purchasing decisions about transport services. I particularly appreciate the thorough considerations on the evolution of research into consumer behavior that was based on a thorough literature review. There is a substantial narrative that refers to classical and modern research trends in consumer behavior theory. He rightly refers to behavioral theories by analyzing models of consumer behavior, considering three key elements: attitudes, needs, and the decision-making process regarding the choice of a product or service. Subchapter 2.3 on transport behavior in the light of consumer behavior models is important as it properly identifies the factors that influence consumers' behavior and purchasing decisions regarding transport services. They include many conditions, especially demographic, personal (mainly the need to travel to work and study) and economic. However, in view of the extensive review of consumer behavior models, some reservations are raised by the lack of a definition of "consumer behavior". In addition, there is no explanation of the criteria used when selecting the models of consumer behavior.

The third chapter analyzes the transport behavior of different generations (Generations X, Y and Z) based on carefully selected literature sources. This chapter is an important element of the theoretical considerations of the dissertation. The Reviewer read with great interest the analysis of the re-evaluation of attitudes towards transport behavior observed in different generations, which is vital for transforming urban mobility towards sustainable solutions. The doctoral student correctly performed the analysis in question, identifying the directions of changes in the behavior and expectations of the surveyed generations. He analyzed both the progressive homogenization and the increasing heterogenization of mobility behavior. These opposing tendencies complement each other in their way. At the same time, they pose a threat to public transport and challenges for future urban planning, as the student noted.



The empirical verification of the scientific problem was reflected in the content of chapters four and five. It was conducted with care and precision based on the procedure proposed in the methodological part of the dissertation.

Chapter four is methodologically important as it is the basis for analyzing the primary data collected in the survey. Based on the current review of information and available statistical data, conclusions were formulated regarding selected characteristics that describe the living conditions and urban mobility systems in Warsaw and Berlin. The chapter explains the process of creating the questionnaire project, the procedures for conducting the study with the target group, the data analysis methods, and the classification used. The conclusions formulated are accurate and interesting, for example, in terms of the correlation between the age of working people and the tendency to use public transport and active forms of travel. The observations regarding the relationship between having access to a car and the tendency to use public transport are also important. For example, they show that in Warsaw, despite the very high rate of car ownership, almost half of the journeys are made by public transport. Such observations are extremely important, especially from the perspective of striving to develop urban mobility in accordance with the sustainable development paradigm.

I highly appreciate the approach to the research model for “daily commuting” presented in chapter five, as well as the factor analysis, which is important for achieving the research goal. To verify the main hypotheses, the author conducted in-depth analyses based on statistical methods, which allowed him to demonstrate the significance of the relationships between the explained and explanatory variables. The multifaceted (i.e., between cities and between generations) comparative analysis is in-depth, and the results are thoroughly and correctly discussed. Data presentation using numerous, clear graphical elements greatly facilitates the understanding of the argument. In addition, the Reviewer appreciates the extensive scope of the research. It is appropriate to adopt the generational criterion, which allows for a more complete interpretation of the development of a smart city and urban mobility in the context of sustainable development.

At the end of the dissertation, the analyses and results of the empirical research were correctly summarized. The Ph.D. student provides properly justified answers to the research questions and hypotheses posed, and thus achieves the research goal adopted. The Reviewer positively perceives the properly formulated conclusions and, importantly, the recommendations regarding the application possibilities of the constructed research model. Undoubtedly, the greatest strength of

the dissertation is that it combines theoretical and practical aspects in the development of a sustainable ecosystem of future urban mobility.

The dissertation uses a wide range of secondary sources (730 items). Referring to the qualitative aspect of the used literature, one can indicate a very good knowledge of the thematic achievements related to the discussed issues and the ability to properly recall it during the research process.

**Summing up the assessment of the substantive content, the Reviewer appreciates the great research work put in by the Ph.D. student in conducting the analyses presented in the dissertation. She considers the conclusions to be valuable; they relate to current and important issues from the perspective of the sustainable development paradigm.**

## **Conclusion**

A detailed analysis of the content of the dissertation allows us to conclude that its subject, as well as the research, are interesting and have interesting cognitive values. The dissertation is a valuable research study on identifying trends and development opportunities for future-oriented sustainable mobility in the context of a smart city. It refers to an important and current scientific problem that has been subjected to multifaceted verification through original empirical research. At the same time, the comments submitted by the Reviewer in no way diminish the value of the dissertation.

In conclusion, the Reviewer states with full conviction that the dissertation submitted for review meets the requirements for doctoral dissertations, in particular:

- it is an original solution to a scientific problem,
- it demonstrates that the Ph.D. student has general theoretical knowledge in the disciplines of economics and finance, and
- it confirms the student's ability to independently conduct scientific work.

**Considering the findings, the dissertation of Abdel-Rahman Fakhani, MSc., entitled “A comparative research of urban mobility in Poland and Germany. On the behavior of different generations,” meets the requirements of the Act of 20 July 2018 Law on Higher Education and Science.**

In view of the above, the Reviewer requests that the Ph.D. student be admitted to public defense. Considering the high substantive level of the dissertation, the Reviewer would like to request that it be awarded with distinction.

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