BEST-WORST ANALYSIS METHOD OF BUSINESS MATURITY THROUGH DIGITAL TRANSFORMATION PROCESSES: AN EXAMPLE FOR IT SECTOR

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ABSTRACT

Purpose- It is aimed to evaluate the maturity of the business through the transition to digital transformation with Best-Worst Method.
Methodology- In this maturity assesstment the weights of the criteria and sub-criteria will be modelled in accordance with the Multi-Criteria-Decision-Making methodology. In this study, digital tansformation process dimensions have been clustered by the experts. In this clustering, the weights of the criteria have been determined by using BWM method. It has been used this method. Because, BWM, in the not-fully-consistent cases with more than three criteria (or alternatives) might bring about multiple optimal solutions. Afterwards, a survey of company employees has been conducted to evaluate the maturity for business.
In the model digital transformation criteria were defined for business according to expert opinions. Finally, the maturity of digital transformation of the enterprise has been determined.
Findings- The results of the solution shows that the most important criteria is competence of automation and the least important one is inflexible company structure criterion. Furthermore, the sub-criteria that belong to each main criterion have been listed in themselves.
Conclusion- The study provides a maturity assessment methodology which is an important part of digital transformation process. This is the first maturity assesstment study under the BWM in the literature.

Keywords: Maturity assesstment, multicriteria decision making, technology firms, BWM.
JEL Codes: O31, M15, C44

1. INTRODUCTION

Digital transformation is a technology-induced change on many levels in the organization that includes both the exploitation of digital technologies to improve existing process, and the exploration of digital innovation, which can potantially transform the business model. Digital transformation is a technology-induced change on many levels in the organization that includes both the exploitation of digital technologies to improve existing process, and the exploration of digital innovation, which can potantially transform the business model. Digital transformation is a technology-induced change on many levels in the organization that includes both the exploitation of digital technologies to improve existing process, and the exploration of digital innovation, which can potantially transform the business model.

A maturity model consists of dimensions and criteria, which describe the areas of action, and maturity stages that indicate the evolution path towards maturity. Maturity models are used in two ways.

- ✓ Descriptive Functionality; maturity models reveal the dimensions which need to be designed.
- ✓ Prescriptive Functionality; this model enables companies to define courses of action or capabilities needed to reach the desired stage of maturity.

The study provides a maturity assessment methodology which is an important part of digital transformation process. This is the first maturity assesstment study under the BWM in the literature. In this study, company employees were asked questions about how they found their company in the digital transformation process. It is aimed to evaluate the maturity of the business through the transition to digital transformation with Best-Worst Method. In this maturity assesstment the weights of the criteria and sub-criteria will be modelled in accordance with the Multi-Criteria-Decision-Making methodology. In this maturity assesstment the weights of the criteria and sub-criteria

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2. LITERATURE REVIEW

In this study the literature review part divided in two part. One is related with application of BWM. The other part is related with digital transformation and maturity assestment. First of all, the best-worst method was introduced by Jafar Rezaei in 2015 (Rezaei, 2015). After that this method was applied to supplier development to supplier segmentation in 2015 (Rezaei, Wang, & Tavasszy, 2015). Then, BWM was extendend with a linear model (Rezaei, 2016). (Boakai, 2016) applied this method for the selection of third party logistics provider. (Rezaei, Nispeling, Sarkis, & Tavasszy, 2016) applied for supplier selection life cycle approach integrating traditional and environmental criteria using BWM. (Guo & Zhao, 2017) introduced fuzzy best worst method. (Çakır & Can, 2019) applied to determine the outsource usage preference for tourism sector with ARAS and BWM. (Moslem, Farooq, Ghorbanzadeh, & Blaschke, 2020) combined BWM and AHP for affecting the drive behaviour factors related to road safety. In recent years, more companies have given significant importance to digital transformation. For this purpose this study has been evaluated in the viewpoint of the latest studies. (Donnelly & Morrison, 2018) has defined the importance of passing the digital transformation process and with their study, it has been aimed to enlighten the companies from where they can start for digital transformation. (Parusheva, 2019) handled digitalization and digital transformation construction with its benefits and challenges. (Sayabek, Suieubayeva, & Utegenova, 2019) has given a roadmap for digitalization process with the scope of digital reality, diigtal aspiration, digital potential, digital fit and digital integration. (Morakanyane, O'Reilly, Philip, & McAvoy, 2020) defined the succes factors in the digital transformation as digital trigger, digital culture, digital vision, digital drivers, digital organization, transformed areas and impacts.

3. DATA AND METHODOLOGY

3.1. Best-Worst Methodology

The Best-worst method is a vector based multi-criteria decision-making method developed by Dr. Jafar Razaei (Rezaei, 2014). This method can be characterized as a pairwise comparison between a set of criteria. From this set of criteria, the participant chooses one criterion which in his or her opinion is most important (best) and one that is least important (worst). The best-criterion is then compared with the remaining criteria and the same is done for the worst-criterion. The benefits of the Best-worst method, compared to other Multi-criteria decision-making methods are:

- ✓ BWM requires less comparison data.
- ✓ It leads to more consistent comparisons, which results in reliable results.
- ✓ BWM can be combined with other MCDM methods.
- ✓ BWM is a simple method to perform; comparisons are performed with integer numbers ranging from 1 to 9.

It seems that BWM may be one of the best methods to use when deciding on weights for parameters (Serrai, Abdelli, Mokdad, & Hammal, 2017). This is because not only the best and worst criteria are predefined by the users, but also the comparison of the other elements to them. Furthermore, this method is not that hard to understand (average) and the requirement of less data makes this method attractive to use.

3.2. Data

The study was applied to a company operating in the IT sector. Business employees were asked questions through the survey about the stages they carried out during the company's digital transformation process. In the study 5 expert managers were asked to evaluate the criteria among themselves. It has been analyzed academic publications on digital business transformation as well as existing maturity assessments. Digital Maturity Models have eight dimensions. These dimensions can be ordered power of traditional processes (minimum), resistance to change (minimum), legacy business model (maximum), competence of automation (maximum), optimization of budget (maximum), relevant knowledge (maximum), inflexible company structure (minimum), security (maximum). Also it has been given the features of these criteria in the parenthesis. Main criteria and sub-criteria have been shown in table 1. And then these criteria have been weighted with respect to the experts' opinion. After that, the evaluations which were obtained by the experts have been entered to the Solver programme via Excel. It can be shown in table 2.

Table 1: Criteria and Sub-Criteria of Digital Maturity Model

CITERIA	SUB-CRITERIA
Power of traditional processes (Minimum)	Understanding of digital journey
	Suitable interaction model

	Integrate distributed efforts
Resistance to change (Maximum)	Compliance
	Stakeholder commitment and collaboration
	Improvement initiatives
Legacy Business Model (Maximum)	Interaction model
	Governance
	Comprehensive communication
Competence of automation (Maximum)	Adequate ease of use
	Process orientation
	Model versions and variants
Optimization of budget (Maximum)	Monitor IT performance
	Optimum resource use
	Meeting needs
Relevant knowledge (Maximum)	Guidelines
	Tool support
	Education
Inflexible company structure (Maximum)	Conventions
	Management support
	IT infrastructure
Security (Maximum)	Independent assurance
	IT risk
	Disruptive for discrete businees problems

Table 2: Ranking the Main-Criteria with respect to Best-Worst Method

CRITERIA NUMBER= 8	CRITERION 1	CRITERION 2	CRITERION 3	CRITERION 4	CRITERION 5	CRITERION 6	CRITERION 7	CRITERION 8
Names of criteria	Power of traditional processes	Resistance to change	Legacy business model	Competence of automation	Optimizati-on of budget	Relevant knowledge	Inflexible company structure	Security
Best criterion by the evaluation of the experts				Competence of automation				
Worst criterion by the evaluation of the experts				Inflexible company structure				
Best to others	Power of traditional processes	Resistance to change	Legacy business model	Comp. of automation	Opt. of budget	Relevant knowledge	Inflexible company structure	Inflexible company structure
Competence of automation	3	4	5	1	2	2	4	2
Others to the worst				Inflexible company structure				
Power of traditional processes				2				
Resistance to change				3				
Legacy business model				3				
Competence of automation				4				
Optimization of budget				5				
Relevant knowledge				2				
Inflexible company structure				1				
Security				6				

After Table 2. data has been entered the solver model, it has been solved. Then, the results of the weights were found in Table 3.

Table 3: Weight of the Main Criteria

MAIN CITERIA	*WEIGHTS OF THE MAIN CRITERIA*
Power of traditional processes	0,113636364
Resistance to change	0,085227273
Legacy Business Model	0,068181818
Competence of automation	0,255681818
Optimization of budget	0,170454545

Relevant knowledge	0,170454545
Inflexible company structure	0,051136364
Security	0,085227273

With respect to Best-worst method, Ksi parameter was found 0.0791. It has shown that our model is consistent.

4. CONCLUSION

According to this study, it has been conducted survey and with respect to this results. It has been determined the importance of criteria for digital transformation process by applying the Best-Worst Method which is a new technique among the Multi-Criteria Decision Making methods. This study is based on the process of the enterprise while going through the digital transformation process. The criteria and sub-criteria included in this process were evaluated by experts. Then, these criteria were weighted with the Best-Worst method. According to these results, the most important criterion was found competence of automation. This means that if the automation used by a business and its employee is useful and user-friendly, it becomes so easy for the business and its employees to make digitalization. Respectively, the other important criteria have been ordered optimization of budget, relevant knowledge, power of traditional processes, resistance to change, security, legacy business model and the least important criterion is inflexible company structure. This result shows that some companies are unable to escape from the digitalization process, despite the company policies that are not flexible in the digitization process. At the same time, the second important criterion is budget. The budget issue is an important criterion in terms of the share allocated by the companies to digitalization. Another important criterion is relevant knowledge that includes informing users adequately in the digitalization process. Likewise, if the traditional processes are more dominant in the business and the resistance to change is very difficult, the digitization process will be just as difficult. Another important consequence is that the enterprise's security and legal process is less important at the point of transitioning to digital process. For further studies, it can be tried with another MCDM methods and compared their results. Also this maturity assestment can be implemented another sector except Information technologies. And the model can be extended for this way.

REFERENCES

Boakai, S. (2016, 6 10). *https://tez.yok.gov.tr/UlusalTezMerkezi/.* https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp received from..

Çakır, E., & Can, M. (2019). Best-Worst Yöntemine Dayalı ARAS Yöntemi ile Dış Kaynak Kullanım Tercihinin Belirlenmesi: Turizm Sektöründe Bir Uygulama. *Atatürk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 1273-1300. https://dergipark.org.tr/en/download/article-file/835917

Donnelly, C., & Morrison, J. (2018). Implementing a Digital Transformation. *RockStep*, 1-4.

Guo, S., & Zhao, H. (2017). Fuzzy best-worst multi-criteria decision-making method and its applications. Knowledge-Based Systems, 23-31. https://doi.org/10.1016/j.knosys.2017.01.010

Morakanyane, R., O'Reilly, Philip, & McAvoy, J. (2020). Determining Digital Transformation Success Factors. 53rd Hawaii International Conference on System Sciences (s. 4357-4365). Hawaii, Manoa: Proceedings of the 53rd Hawaii International Conference on System Sciences.

Moslem, S., Farooq, D., Ghorbanzadeh, O., & Blaschke, T. (2020). Application of the AHP-BWM Model for Evaluating Driver Behavior Factors Related to Road Safety: A Case Study for Budapest. *Symmetry*, 1-11. https://doi:10.3390/sym12020243

Parusheva, S. (2019). Digitalization and Digital Transformation in Construction - Benefits and Challenges. Information and Communication Technologies in Business and Education, (s. 126-134). Varna. ISBN: 978-954-21-1004-0

Rezaei, J. (2015). Best-worstmulti-criteriadecision-makingmethod. *Omega*, 49-57. https://doi.org/10.1016/j.omega.2015.12.001

Rezaei, J. (2016). Best-worstmulti-criteriadecision-makingmethod: Some properties and a linear model. *Omega*, 126-130. https://doi.org/10.1016/j.omega.2015.12.001

Rezaei, J., Nispeling, T., Sarkis, J., & Tavasszy, L. (2016). A supplier selection life cycle approach integrating traditional and environmental criteria using the best worst method. *Journal of Cleaner Production,* 577-578. https://doi.org/10.1016/j.jclepro.2016.06.125

Rezaei, J., Wang, J., & Tavasszy, L. (2015). Linking supplier development to supplier segmentation using Best Worst Method. *Expert Systems With Applications*, 9152-9164. https://doi.org/10.1016/j.eswa.2015.07.073

Sayabek, Z., Suieubayeva, S., & Utegenova, A. (2019). Digital Transformation in Business. S. I. Ashmarina, M. Vochozka, & V. V. Mantulenko içinde, Digital Age: Chances, Challenges and Future (s. 408-415). Switzerland: Springer Nature Switzerland. https://doi.org/10.1007/978-3-030-27015-5_49