Multi-Criteria Decision Making Application in the Education Context

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Abstract

Business schools are confronted with a challenge of developing students to be managers, focused on productivity and adding value at the work process. 21st century education should aid student population substantially in thinking beyond profitability and self-interest and lead their strategical thinking process towards sustainable development. Our aim is to help the teaching staff in business education by providing them the tools to understand their students' decision-making process and preferences. The goal of the study is to investigate if modern technologies support responsible decision making of students. A quantitative study was carried. The tool used was Super Decisions Software. Our results show that technology, even though a potentially useful tool in the responsible decision-making process needs integration into the appropriate business models. The sample of students' behaviours in decision-making process can also be identified as responsible.

Keywords: decision-making, higher education institution, teaching staff, business school agenda, multi criteria
JEL classification: O31, O32

Introduction

Samuelson (2006) states that business schools should encourage students to question their decision models, promote long-term decision models and wider consultation. Adler (2016) calls for a new skill mix in business curriculum, offering a larger span of courses, dealing with critical thinking, negotiations, environmental and cultural sensitivity. Also Giacalone(2004) claims that 21st century business education should support students in thinking holistically, about personal, social and natural challenges. Burke et al. (2006) claim that business classes should make room for intuitive decision making so that students could see the value of tacit knowledge, and intuitive judgements, besides logical decision making approaches. At the same time, Atwater et al. (2008) recommend that business schools develop courses to strengthen students' systemic thinking.

Crossan et al. (2013) propose that ethical decision making can be strengthened by developing character strengths, such as open mindedness, compassion, and humility. Sonenschein (2016) elaborates on the role that employees play inside of the companies as social change agents and acknowledging that they have a more important role in addressing social welfare than we thought till now. They are capable of introducing and coordinate socio-environmental agenda inside of their organizational borders. Bomgardner (2016) states that apparel brands must produce products more sustainably and later on also recycle the used products. Bomgardner (2016) also provides an example of Adidas which made athletic shoes out of nylon recovered from illegal fishing nets and polyester from soda bottles. We recommend

that business students practice responsible decision making through studying these kinds of case studies. Cases are a common part of management education (Brown et al., 2010), therefore effective and responsible decision making cases would involve producing innovative alternatives (Ganster, 2005).

Atwater et al. (2008) propose business educators develop in their students: 1) Ability of dynamic thinking by emphasizing: Do you see a phenomena of decision making as the result of your behaviour over time?; 2) Ability of synthetic thinking by emphasizing: Are you interested in the world around you, do you study the role and purpose of a system to understand its functioning?; and 3) Closed-loop thinking emphasized by: Do you think about the interaction of different social and environmental factors?

As it was already mentioned, the global environment is becoming more and more complex. Accordingly, the major part of business (and other) decisions becomes less routine and more challenging. Moreover, regarding the problem complexity issues, Saaty et al. (1985) indicated the relations between systems ideas and AHP (Analytic Hierarchy Process as helpfull basis for system thinking considerations. The complexity indicate the presence of numerous, interrelated factors which required to be involved and considered as integrated part of whole decision making process as well as supported with particular technical solution.

Inside that mindset the specific software tools (i.e SuperDecision Software (2016), ExpertChoice (2014), Logical Decision (2014), Decision Lens (2016), PriEsT/Priority Estimation Tool software (2016) has been developed to provide a highly comprehensive number of analytic hierarchy processes and derived methods.

Our aim is to help the teaching staff in business education by providing them the tools to understand their students' decision-making process and preferences. The research goal of this study is to examine if modern technologies support responsible decision making of students. Taking all previously elaborated statements in consideration and with the aim to understand the process of decision making better, supported with technology, within student population, in the empirical part, the authors create the scenario relevant to this research. In that context, it is explored the students making decision process regarding choosing sport shoes as defined objective (overall aim). The research results are focusing primarily on evaluation criteria importance, that consequently lead to selecting particular sport brand. In mere designed research the multi criteria decision making framework (Saaty, 2001) is used to verify the qualitative nature of student's making decision process.

Methodology

AHP method

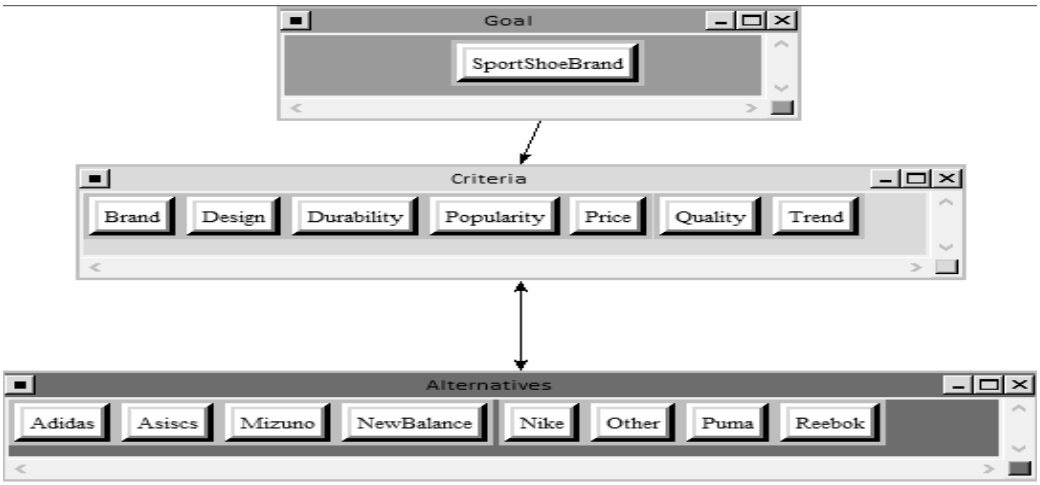
Analytic Hierarchy Process (AHP) has been developed by Thomas L. Saaty (2001). The author elaborated the method as "a structured technique" for analyzing complex decisions. Conceptually, AHP is theory of measurement throughout pairwise comparisons. The base for named comparisons is derived priority criteria according expert judgements (Saaty, 1980; Saaty, 2008). Namely, the comparisons are made using a scale of judgement that indicates the dominance of one criterion over another considering a given alternative. The literature already reported practices of AHP method application within multi-criteria decisions context such as: selections processes of telecommunication systems (Tam et al., 2001), ERP systems (Kim et al., 2003; Liu et al., 2005; Wei et al., 2005), product marketing strategy (Mohaghar et al., 2012).

The core activities within decision making process provided with AHP method is developing the AHP model and criterion ponders determination. An overall goal, criteria, and decision alternatives are constitutive parts of the AHP model (Saaty, 2001).

Research design

In accordance with the overall goal (choosing sport shoes) the authors firstly determine the relevant set of criteria (i.e. brand, design, durability, popularity, price, quality, trend) and decision alternatives (i.e. Nike, Puma, Mizuno, Reebook, New Balance, Adidas, Asics and others). Secondly, the associated AHP model (Figure 1) is created in SuperDecision software (Creative Decision Foundation, 2016). The named software is elected and used due to its easy-to-use set of decision framing and analytic tools as solution that supports the entire decision making process explored in this research.

Figure 1
The Model Related to Current Research, Created in Super Decision Software.



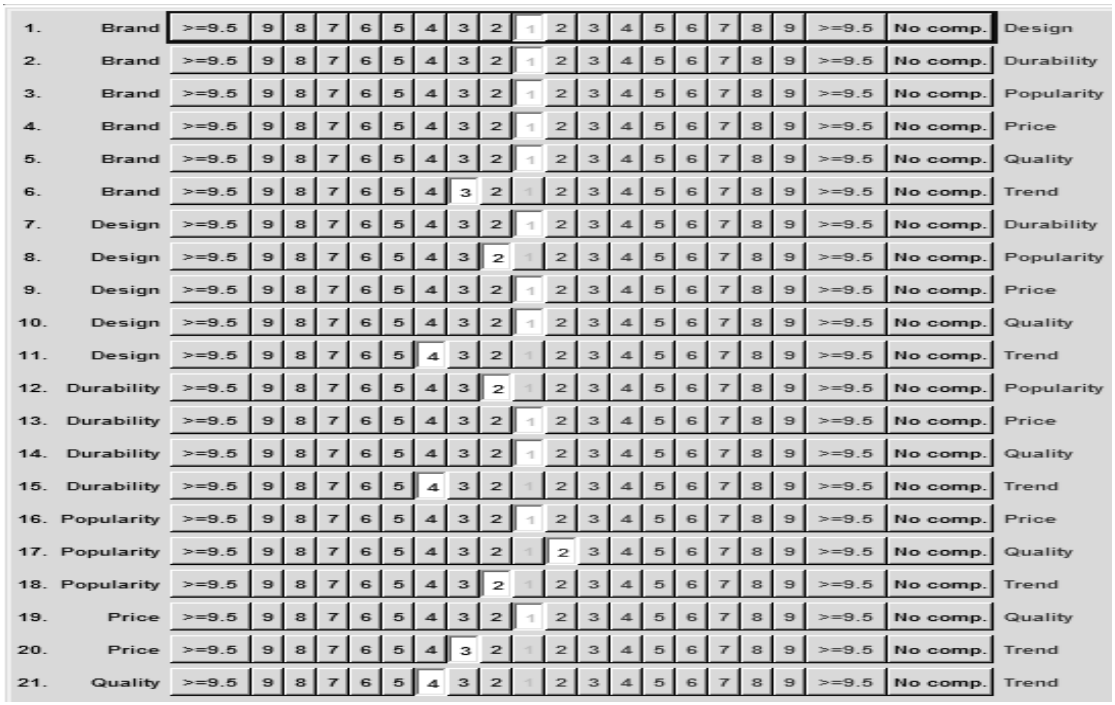
Source: Authors' work

Thirdly, the related on line questionnaire is created and sent to 226 students asking them, as equally valuable evaluators, to assess the relevance of criteria considering the given alternative, i.e. to estimate the relative weight of each criterion in relation to each alternatives. The return rate of 25 % refers on 58 completely fulfilled and returned questionnaires. Actual measurement was subjective students' opinion. With the intention to define the relative importance of the criteria, the questionnaire was previously modified to be similar with software user interface (Table 1).

Based on collected data, pair wise comparisons between criteria are inputted in Super Decision software (Creative Decision Foundation, 2016), as well as comparison between alternatives and criteria. The examples of one criteria comparison with respect to one of 8 alternatives are presented in Table 1:

Table 1

The Criteria Comparison with Respect to One Alternative (SuperDecision Software Output)



Note: N=58
Source: Authors' work

The above process was repeated for each alternative. Finally, calculated pairwise comparison between criteria as well as comparison between alternatives and criteria resulted with particular criteria weighting ratio with respect to all alternatives which provided authors the core information in their attempt to explore the nature of decision making process within student population. The exact numbers are presented in the next paragraph.

Results

The final pairwise criteria comparison with respect to all alternatives (Table 2) ranks the quality (0,17184) as the most weighted criteria, followed by durability (0,17091), design (0,16741), price (0,15277) and brand (0,11528). The lowest ranked are trend (0,11346) and popularity (0,10833) . The below enclosed findings support the main research assumption and reveal students as educated in thinking beyond profitability and self-interest as well as being prepared for positions of authority.

Table 2
The Final Pairwise Criteria Comparison with Respect to All Alternatives (SuperDecision Software Output)

Brand	0.11528
Design	0.16741
Durability	0.17091
Popularity	0.10833
Price	0.15277
Quality	0.17184
Trend	0.11346

Note: N=58
Source: Authors' work

Accordingly, the software also calculated the best ranked alternatives (Table 3).

Table 3
The Best Rated Sport Brand (SuperDecision Software Output)

Here are the overall synthesized priorities for the alternatives. You synthesized from the network Super Decisions Main Window: AHP_sport.sdmod

Name	Graphic	Ideals	Normals	Raw
Adidas		1.000000	0.136043	0.068022
Asiscs		0.867720	0.118048	0.059024
Mizuno		0.823568	0.112041	0.056020
NewBalance		0.923304	0.125609	0.062805
Nike		0.988298	0.134451	0.067226
Other		0.964809	0.131256	0.065628
Puma		0.879895	0.119704	0.059852
Reebok		0.903003	0.122848	0.061424

Note: N=58
Source: Authors research

Relating to theoretical consideration enclosed in first paragraph, the main focus of this research is directed to criteria evaluation findings in context of decision making process, the selection of best alternatives (particular sport brand) is just integrative part of set up scenario with lower relevance to this research.

In spite of this, the related information takes the practical implication to sport brand producers within sport industry enabling them to compare their positions, explore the related causes and effects and according act on particular improvements.

Discussion

The above presented process enabled creating a constructive environment for testing theoretical research framework as well as for investigating the research topic more in detail. Using AHP method the most weighted criteria are selected and then the best solution is selected. In other words, case of Faculty of Economics University of Split business students demonstrated responsible decision making as quality was ranked as the most important criteria in their decision making process. Second most important criteria was durability which clearly supports the basic elements of

sustainable leadership characteristics in the students. Scott (2016) emphasizes the shift of European Union's economy from linear towards circular economy where responsible decision making focused on durability, regeneration and restoration is an important part of it. When deciding for a new product one aims to use it for a longer period of time, not dependable on fashion and contemporary popularity, which proved to be the least important criteria. Bomgardner (2016) states as unclear how well are suited today's products for continuous reuse. Moreover, some individual brands hope that their sustainability efforts will appeal more consumers than inexpensive, mass-produced goods in the crowded market-place (Bomgardner, 2016). Students are not strongly influenced by the promotion and trends. We understand trend in terms of global orientation whereas we perceive popularity as more of a local component in decision making process. Price is a fact; one first needs to make a choice.

Professors should support business students in their responsible decision making as technology can only provide a limited support. Besides logical decision making component that ICT programs can offer we also need to provide an environment in business education for responsible decision making. Program cannot fulfill all the potentials of in the decision making process. SuperDecision Software (Creative Decision Foundation, 2016) is a good tool to support decision making processes, but to achieve responsible decision making, it has to be integrated with a strategically more relevant business model.

Conclusion

Business students seem to be ready to take on responsible managerial positions. Managers are entrusted with the exclusive power; therefore they should perform responsible decision making (Dipadova-Stocks, 2005). Students proved to be responsible in their decision making.

Regarding AHP method, the authors argued it as innovative potential to be used in different areas to enable as more as comprehensive decisions making process within dynamic environment. When implemented in business model in accordance with real business needs, the role of technology becomes congruently recognized. In other words, new technologies significantly support such decision making processes, but although reliable partner in the decision making process, continuous integration with business models is *sine non quo*. Limitations of our study are based on the small sample and single study.

As far as further research is considered, we agree with Dane et al. (2007) that further research should focus on the role of intuition in decision-making setting with intention to better approach and understand the non-conscious human processes.

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