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A Frame Work of Multistage Decision Making

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This research has objective to analyze some tools which are used to support decision maker to make a decision in multi stage and systematic way. And also in making decision, there are a qualitative type and quantitative type. In order to get an optimum decision making, the decision maker needs systematic way. There is the frame work which is based on combination of some existing methods and challenges emerging in organizational activities, including social organizations as well as business organisations. To formulate the framework, this research conducted focus group discussion consisting of some organizational managers as participants. There are five components of proposed frame work: (1) Criteria Identification through Focus Group Discussion (FGD); (2) Criteria Selection; (3) Focus Group for Criteria Verification; (4) Multicriteria Decision Making based Analytic Hierarchy Process (AHP); and (5) Impact Analysis. This research resulted in an effective approach of decision making which allows decision maker to have objective and rational reason in each step of its decision-making process. Strength of the proposed framework is to provide rational and objective approach in group decision making. However, it takes longer time to conduct decision making due to more steps and participants involved. As a conclusion, the proposed research has been successful in establishing a multi stage and rational decision-making process.

Keywords: focus group discussion, multi criteria decision making, systematic, multi stage, qualitative, quantitative

Introduction

Making decisions has never been easy, due to complexity and dynamique of circumstances, in which our choices may affect people's work, social and financial assets, and other activities. Important decision makers have based their own choices on personal experience, intuition, and knowledge, but sometimes using non-systematic ways. To make decisions, decision makers are called to demonstrate that our choices are based on the best available evidence, but however, many decisions making did not base on comprehensive aspect. This implies non-accountable and non-objective argumentation. This fact offers some challenges to improve decision-making process in order to better serve society. Birnbaum, Navarro-Martinez, Ungemach, Stewart, and Quispe-Torreblanca (2016) proposed risky decision making: Testing for violations of transitivity predicted by an editing mechanism. This research tried to handle transitivity which is the assumption that if a person prefers A to B and B to C, then that person should prefer A to C. This article explores a paradigm in which Birnbaum et al. (2016) thought people might be systematically intransitive. In this study they applied a true and error model to test intransitive preferences predicted by a partially effective editing mechanism. On the other hand, this research is focused on very specific aspect without considering multicriteria aspects. In reality, the

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industry has to improve its competitive advantage. One of strategic aspects in social and industrial management is how to manage their business considering many factors, such as production cost is related to material, procurement cost, inventory cost, deffect, etc. Decision making using multicritera becomes key success factor in running business. It has to cope with every aspect: procurement lead time, insurance materials, expired date, vendor availability, and more subjective aspects such as the reputation of the vendor. Thus, main criteria have to be found and an evaluation of those criteria for every alternative has to be done. Such an organization can be run by following some existing methods like Analytic Hierarchy Process, Focus Group Discussion. In brief, there is a need to back up decision maker in order to have decision-making process using systematic and objective ways. In reality, some decision makers take decision based on criteria that are assumed to conform with their necessity. However importance of criteria is often influenced by subjective and individual point of view. That's why, there is a need to develop approach allowing decision maker to select related criteria and representing not only his own subjective point of view but representing objective point of view. Other issues emerging in decision-making process are related to quantification of qualitative criteria. To support decision maker in taking objective decision, criteria quantification has important role. So, decision maker can utilize multicriteria decision-making methods by exploring judgement and scoring its degree of importance. In this case, weighting methods can be applied to produce criteria degree of importance. The last issue is concerning mechanism accommodating expert point of views especially in criteria selection. In fact the best criteria have to represent expert judgements.

Literature Review

There are some previous researches related to group decision making. Zigurs and Buckland (1998) developed a theory of task/technology fit in Group Support System (GSS) environments based on attributes of task complexity and their relationship to relevant dimensions of GSS technology. Yam, Tse, and Tu (2001) indicated the the intelligent predictive decision support system (IPDSS) model that provided reliable fault diagnosis and strong predictive power for the trend of equipment deterioration. Gagani, Pasiouras, and Zouponidis (2006) identified that the asset quality (as measured by loan loss provisions), capitalization, and the market where banks operate are the most important criteria (in terms of weights) in classifying the banks.

Kayikci (2010) explored the applicability of the way for the development of a conceptual model based on a combination of the fuzzy-analytical hierarchy process (AHP) and artificial neural network (ANN) methods in the process of decision-making in order to select the most appropriate location. Kousalya, Reddy, Supraja, and Prasad (2012) proposed selection of a student from an engineering college who is eligible for All Round Excellence Award for the years 2004-2005 by taking subjective judgments of decision maker into consideration. Based on the result of above researches, there are some models trying to propose objective and rational decision-making process; however it is not so clear how group decision making process is conducted and there is still absence of multi stage decision process. According to Krueger (1988), a focus group discussion (FGD) is a good way to gather together people from similar backgrounds or experiences to discuss a specific topic of interest. Morgan (1988) explained that FGD can be useful in providing an insight into different opinions among different parties involved in the change process, thus enabling the process to be managed more smoothly. According to Stewart and Shamdasani (1988), FGD sessions need to be prepared carefully through identifying the main objective(s) of the meeting, developing key questions, developing an agenda, and planning how to record the session. The Analytic Hierarchy Process (AHP), introduced by Saaty (1980), is an effective tool for

dealing with complex decision making, and may aid the decision maker to set priorities and make the best decision. As conclusion, based on above literature survey, there is an opportunity to develop rational and objective decision-making process involving group decision makers and multi stage process.

Research Method

The proposed research used the following method. As first step, main issue was identified. In this case, the main issue is related to reality that there is often decision-making process handled by one single decision maker but in fact it concerns multi aspects, multi sectors, and multi decision makers. In addition the individual decision-making process is often based on subjective judgment. The next step is to identify existing qualitative and quantitative approaches. This step has objective to map decision-making style that uses qualitative approaches and quantitative approaches and its argumentation. There is possibility that decision making uses combination qualitative and quantitative approaches. On the other hand, the proposed research identified related previous research which explored group decision-making process and its contribution to decision-making effectiveness. Then the research tried to analyse existing concepts and tools to identify breakthrough and limitations envisaged in decision-making process. Finally, the research tried to propose a framework which accommodates multi stage and group decision-making process.

Research Result

There are five components of proposed frame work.

Criteria Identification

To identify criteria, basically there is principle that must be fixed, especially relevance to the mission and vision of organization or relevance to main goals of programs and activities. For effectiveness, goals should be measurable, attainable, and well communicated with stakeholder engagement, consequently creating a meaningful strategy map that is aligned authentically to the purpose of the business (L. Stainer, Mestre, & A. Stainer, 2009). In this stage, Focus Group Discussion was conducted in order to have more objective views originating from many experts. This principle becomes reference for identifying main criteria in decision-making process. In this stage, points of view of related experts are needed. And they must be based on in-depth experience and complete information.

Criteria Selection

In order to class this list in descending order of relevance, the research conducted a survey involving experts who are directly involved in the given problem. In this case, a questionnaire, in which the experts have to give a mark to each criterion, is distributed. The experts use the three-point scale of “not important”, “somewhat important”, and “very important” using “Cut off Point” approach as developped by Tam and Tummala (2001). In this step, selected criteria according to its degree of importance were identified. The most important criteria from list of criteria candidates were found. The result of this stage is list of seleted criteria that will be used for decision making.

Focus Group Discussion of Criteria Verification

The selected criteria as described in precedent stage are not automatically criteria that are ready to be used in decision-making process. In fact there is possibility that the selected criteria are not realistic or there are some criteria which are not included in the list. The latter can happen in case when some points of view are not

considered in the precedent Focus Group Discussion. Thus, in this stage, decision makers have to run again Focus Group Discussion in order to identify and to have diagnosis if there are any missing criteria or unnecessary criteria in the list. The diagnosis is performed in three main steps: (1) in-depth documental analysis; (2) face-to-face interviews with stakeholders from diferent level hierarchical and functions; and (3) consolidation of the results with quantitative data analysis (Pigosso & McAloone, 2015). This stage finally is cosidered as agreement point to fix final list of criteria. Then this final list of criteria can be used in next stage, i.e. multi criteria decision making.

Multi Criteria Decision Making Based Analytic Hierarchy Process (AHP)

This stage is to build decision tree, which is basically composed by three levels: the goals, the criteria, and the alternatives. According to methods of Analytic Hierarchy Process (AHP) (Saaty & Vargas, 1994), decision makers build the decision tree which consists of: (1) The goal (1st level): mision or objectives; (2) The criteria (2nd level): criteria list resulted from stage 3; (3) The alternatives (3rd level): contains list of alternatives related to each criterion.

Criteria and alternative weighting. In the second level, all criteria are weighted using pairwaise comparison proposed by AHP approach (Saaty, 1980). Results of questionnaire survey are translated into pairwise comparison matrix and then it is followed by weighting process. AHP method provides a fundamental scale to assign pairwise comparison judgment (Saaty & Vargas, 1994). AHP method proposes to create as many refinements as needed for the specific problem, and to estimate verbally the value of each new point of the scale. Results of these judgments are summarized in pairwise comparison judgement matrice (PCJM). Alternatives are wighted using the same way as criteria weighting described above. Finally, alternative scores are calculated by sum of multiplication between criteria weights and alternative weights. The biggest score represents the most priority alternative to select.

Impact Anaylisis

Because decision makers are bounded by the cognitive limitations of all human decision makers, they actually do make rational decisions that are bounded by often uncontrollable constraints. The rational model of decision making suggests that the problem solver would seek out and test each of the solutions found in the problem space until all solutions were tested and compared. At that point, the best solution would be known and identifiable. It means that, although the decision model described in stage 4 offers the most priority solution alternative, it is necessary to examine this most priority alternative compared to other alternatives. In reality, the best alternative does not automatically give best impact. That’s why, in this stage, the proposed framework tries to evaluate and analyse impacts of each alternative. The impacts are analysed based on some scenarios, such as: change of criteria weights. The change of criteria weights directly influences priority of solution alternatives. Aditionally, decision makers have rights to put some aditional judgements which before are like blind spots. The blind spots are factors or situations that have not been seen or considered by group of experts involved in stages 1 and 3. In this case, decision makers can communicate with expert groups to asses possibility of criteria changes or alternative candidate changes. After defining this new condition, the process is repeated again starting from stage 1. If the new best alternative is better than precedent best alternative resulted from first iteration, so this new best is selected as final solution. Otherwise, the precedent best alternative resulted from first iteration is selected as best alternative and it is considered as an acceptable solution to the problem.

Analysis

This research has proposed a framework of multi stage decision making. And this framework tried to facilitate group decision making and multi criteria decision making. There are some contributions of this framework, such as: it is more suitable to support decision making that involves many sectors or functions in an organization. For example, if a company wants to make decision of spare parts procurement, so there are some functions that must be involved such as: operation, maintenance, inventory, procurement, and financial units. In this case, each function has its own point of view concerning importance of procurement. As a consequence, its functions and each decision maker have different criteria that can be used in decision-making process. Using the proposed framework, diversity of point of view and criteria can be solved by FGD and multi criteria approaches. The proposed framework also contributed to impact analysis, when the decision alternatives are evaluated based on its impact on the organizational performances. In the proposed framework, decision makers have facility of multi stage process, and this contributes to evaluating decision alternatives step by step. Decision makers are allowed to have more systematique procedure and more accountable process. However, this framework has some weakness, such as: it takes longer time to implement, where it has to involve many decision makers from different units and functions. In fact these decision makers do not automatically have same time availability to gather for conducting FGD. Besides, this proposed framework has not been implemented. For future development, it needs to implement the framework in same area of organization to identify its effectiveness.

Conclusion

The proposed framework tries to contribute to increasing effectiveness and accountability of decision-making process. The effectiveness is shown by impact analysis stage (stage 5) where all impact possibilities are evaluated before acceptable solution is fixed. Point of accountability is shown by stage 1 until stage 4, where criteria and alternative selection are based on multi expert opinion, in which criteria and alternatives are identified in objective ways. This framework has limitations, where the iterations run only maximum two times. Of course this approach does not guarantee optimal solution. Additionally, decision-making process takes longer time compared to many existing decision-making processes due to integration between criteria selection and decision-making process itself. This framework has to be examined and verified in the real world. In this case, for future research there are some opportunities of development, such as: case study in some types of organization including services and manufacturing industries. Besides, it can be applied in social organization such as governmental institutions, foundations etc. The decision model can further be developed not only using AHP, but other methods can be explored by such artificial intelligence.

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