Project Management Decision under Ambiguity:

An empirical Investigation in China

Guan Tian[1, a], Liang Zhizhen[2, b]

[1]School of Limkokwing University of Creative Technology, 63000 Cyberjaya, Malaysia;

[2]School of Liang Zhizhen, Wuchang Institute of Technology, Wuhan 430080, China.

[a]heihongse86@qq.com, [b]178482116@qq.com.

Abstract

This paper study the project management decision under ambiguity in China. A survey will be conducted in order to investigate what is the level of ambiguity aversion and what are the important factors that will affect the ambiguity aversion level in China. The causal relations and interrelations among these factors are also important to help us form a complete model to explain Project Management decision under ambiguity in China. Thus a structural equation model will be used in order to recover these important relationships. This is the first paper to investigate Project Management decision under ambiguity in the context of China. These relationships will be important for understanding and improving project management decision under ambiguity in a complex dynamic economic environment like China. These results will be helpful for problem solvers in project management to identify the fundamental sources of ambiguity in the Chinese economy and provide crucial information for managers or researchers to modify their decision model and informational processes.

Keywords

Ambiguity, Project Management decision, Chinese economy.

1. Introduction

Completing a project on time and within budget is not an easy task. The project scheduling phase plays a central role in predicting both the time and cost aspects of a project. More precisely, it determines a timetable in order to be able to predict the expected time and cost of each individual activity. The environment of project management decision is highly complex. To counter this kind of complexity a lot of decision model has been built. For example, the classic methods like program (or project) evaluation and review technique (PERT), Critical path Method (CPM) or Graphical evaluation and review technique developed in 1996. Some of the latter methods derived from concepts in mathematics. For example, some of them used tools in dynamic programming and decision tree such as the one proposed by Ludwig et al. (1998) which is a method so-called dynamic policy for project management.

Most of the time, these kinds of methods will need to operate under an environment with risk and uncertainty. The manager or the management team will need to identify all possible events and their impact on the project. All of these methods are very useful. However, a different line of researches shows that modification may need to be made to these models because of the concept of "ambiguity".

In a problem-solving view, Schrader et al. (1993) emphasized the difference between uncertainty and "ambiguity". Schrader et al. (1993) also argue that problem-solving under ambiguity might make problem solvers think they do not yet have a "good grip" on the problem. This would imply an inability to decide on the problem scope, to define the tasks involved, to discriminate relevant from irrelevant inputs, or to identify desired outcomes.

This paper will try to empirically identify the general sources of ambiguity in project management in China. A structural equation model will be used in order to recover these important relationships between ambiguity and their general source. These results will be helpful for problem solvers in project management to identifies the general sources of ambiguity in China and provide crucial information for them to modify their decision model and process.

2. Literature Review

There are varies of methods to analyze project management decision under ambiguity, including the method of historical research, methods of comparative research, the method of case analysis, inductive-deductive method. Method of historical research: Management is formed and developed in the historical process of enterprise development, and research history can analyze the status quo and predict the future; Methods of comparative research: It is possible to identify and collect advanced management theory from different countries for comparative research; Method of case analysis: Management is a very practical subject, so it is necessary to pay attention to the analysis of actual cases and continuously summarize lessons learned; Inductive deductive method: It is good at summing up experience, dealing with the relationship between individual and general, from individual to general inductive reasoning method from fact to generalization, from general to individual is the reasoning method from general principle to individual conclusion.

In order to analyze project management decision under ambiguity one will need to first consider different models that could help to analyze ambiguity. For some general models, Einhorn & Hogarth (1985, 1986), and Hogarth & Einhorn(1990) use introspective judgments of probability as an input to analyze ambiguity. Hey, Lotito, & Maffioletti (2008) tested several theories for uncertainty and find that models with too many parameters do not perform well. Wakker (2010) summaries several models based on rank dependence that could be used to analyze ambiguity.

To measure ambiguity, Jaffray (1989) and Kahn & Sarin (1988) suggest that Bayesian subjective probability and the matching probability could be used as an index of ambiguity aversion. In an experiment, Baillon et al. (2018) uses an index design to measure ambiguity attitudes for natural events that as a simple case of belief hedges. Other methods included Abdellaoui et al. (2011), Brenner & Izhakian (2018), and Gallant et al. (2017).

For work specifically designed for a project management decision, Pich, Loch & Meyer (2002) express uncertainty, ambiguity, and complexity in terms of information adequacy. Pich, Loch & Meyer (2002) identify three fundamental project management strategies: instructionism, learning, and selectionism. Pich, Loch & Meyer (2002) also show that classic project management methods emphasize adequate information and instructionism and demonstrate how modern methods fit into the three fundamental project management strategies. Pich, Loch & Meyer (2002) concludes that an appropriate strategy is contingent on the type of uncertainty present and the complexity of the project payoff function.

3. Methodology

3.1 Data collection.

We targeted top managers from a variety of industries in China. We aim to use a similar data collection method in Grandon and Pearson (2004). First, we will sample around 3000 companies from various source. This companies' name, contact person, and email or mail address must be identified. Then, an email or mail that explain the purpose of this study with a questionnaire will be sent to these contact persons. We believe that the response rate in China will be much lower than the one in

Grandon and Pearson (2004), thus, we believe setting a sample for 3000 companies will be more reasonable.

3.2 Measuring ambiguity.

Dimmoc et al. (2016) showed that matching probabilities could be used for measuring ambiguity attitudes. Applications include Kahn and Sarin (1988) and Viscusi and Magat (1992). Baillon et al. (2018) argue that matching probabilities entirely capture ambiguity attitudes, free from any complications regarding risk attitudes because those risk attitudes drop from the equations and do not need to be measured. Baillon et al. (2018) suggests that belief hedges allow for direct measurements of ambiguity attitudes for natural events. They proposed the ambiguity aversion index b as following:

$$b = 1 - \overline{m_c} - \overline{m_s}$$

Where $\overline{m_s} = (m_1 + m_2 + m_3)/3$, $\overline{m_c} = (m_{12} + m_{13} + m_{23})/3$, $m_i = P(E_i)$, and $m_{ij} = P(E_i) + P(E_j)$, that $P(E_i)$ is the subjective probability of event E_i. The index help us to calibrate ambiguity neutrality, providing control for subjective likelihoods even though we do not know them. As Baillon et al. (2018) suggests, this happens because the subjective likelihoods drop from the equations irrespective of what they are. This observation is key to this method. Maximal ambiguity aversion occurs for $b = 1$. The matching probabilities of all events are then 0. Ambiguity aversion is minimal when $b=-1$, and in this case the matching probabilities for all events will be 1. The ambiguity aversion index can also be defined if we only consider a two-events. Baillon et al. (2018) suggests that we can focus on only one event E_i and its complement E_i^c, and substitute $m(E_i)$ for $\overline{m_s}$ and $m(E_i^c)$ for $\overline{m_c}$ in the ambiguity aversion index b, maintaining the control for likelihood. This would reduce the measurement effort at the cost of reliability. Thus, using this index, we could ask problem solvers' view on different events' probability to measure their ambiguity aversion level, and therefore the implication on project management decision.

4. Conclusion

In my own view, the relevant literature in management focus a lot on management science, expounding the essence of management from all aspects, that is, a theoretical based application rather than pure theory. From the literature, we can learn both theory and application. Due to the variety of different management in practice and the diversity of knowledge and skills that are integrating with other different disciplines, management has provided us with a rich theoretical perspective with strategic behavior of human in the commercial world. Thus, it has a solid foundation to assist us in better understanding the managerial decision which as a fundamental cause to lead the success of the organization. Besides, it allows us to have an opportunity to compare, criticize and reflect on the management theory which can deepen the understanding of the nature of management in the professional practices of organizations, both the public and private sector.

Management plays an extremely important role in the development of modern society: socialized production will become more and more complex, and the ever-changing society will need more scientific management; learning, research management is to cultivate managers. An important part of the process is that only by mastering solid management theories and methods will help us to guide the practice well and shorten or accelerate the growth process of managers.

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