

Enterprise Disruptive Innovation Risk Evaluation---A Case Study on Yu'ebao

Yang Zhou, Qing-pu Zhang

School of Management, Harbin Institute of Technology, Harbin, Heilongjiang Province, China

Abstract - Disruptive innovation is a special kind of innovation, in which many risks perform more prominent and cause more serious damage. It is necessary to identify and evaluate these risks for guiding disruptive innovation implementation and innovation risk risk circumvention. Based on the characteristics of disruptive innovation, the risk evaluation index system is constructed, which not only includes the general indexes, but also includes the indexes that inspect the risk caused by the “disruptiveness” and “opportunity” of disruptive innovation. The weight for each index is set up with the method of sequence relations, and disruptive innovation risk evaluation model is constructed with the method of fuzzy comprehensive evaluation. Finally, in the case of Yu'ebao, the rationality and operability of the disruptive innovation risk evaluation model is verified. When used in disruptive innovation risk evaluation, the model constructed in this paper is more applicable and accurate than the general risk evaluation model.

Index Terms - Disruptive innovation risk; risk evaluation; Yu'ebao risk

1. Introduction

Disruptive innovation refers to the innovation that attracts non-mainstream customers through technological or model innovation. It creates a new value network in non-mainstream market and permeates to mainstream market, finally displaces the mainstream products in the mainstream market [1-3]. More and more enterprises try to enhance their competitiveness through disruptive innovation. However, disruptive innovation also accompanies with high risk. To disrupt the existing technology or business model is not an easy thing. Comparing with that in traditional innovation, the occurrence probability of risk is higher, the sources of risk are more complex and the loss caused by risk is more serious in disruptive innovation [4]. It is very important to identify and evaluate disruptive innovation risk factors scientifically, which is very helpful for evading disruptive innovation risk.

There are only a few studies on disruptive innovation risk so far. Keizer and Halman pointed out it was inherently risky in disruptive innovation, and they divided disruptive innovation risk into two kinds: explicit risk and fuzzy risk [5]. Wu etc. put forward the development strategy of disruptive innovation through studying on the risk from the aspect of competitors [4]. However, there isn't any discussion about some other important issues of disruptive innovation risk in existing research, like what prominent risks do disruptive innovation have and how to evaluate them, which this study will focus on.

The aim of this study is to construct an efficient evaluation model for disruptive innovation. To achieve it, three steps were conducted. Firstly, risk dimensions are refined with the method of literature review. Secondly, the evaluation

index system is constructed and weighted. Thirdly, the evaluation model is constructed with the method of fuzzy comprehensive evaluation. Finally, in the case of Yu'ebao, the rationality and operability of the evaluation model is verified

2. Disruptive Innovation Risk Dimension

By the method of literature review, risk factors are collated from the researches on innovation risk evaluation in last 5 years. Based on characteristics of disruptive innovation, 7 risk dimensions are refined: technology dimension, management dimension, rival dimension, consumer dimension, value chain dimension, legal dimension, and other dimension.

Technology dimension risk refers to the risks caused by lack of technical ability or caused by high technical cost. Management dimension risk refers to the risks caused by poor management. Rival dimension risk refers to the risks caused by the uncertain behaviors of the existing competitors and potential competitors. Consumer dimension risk refers to the risks caused by the uncertain behavior of consumers. Value chain dimension risk refers to the risks caused by the fracture of the value chain, owing to the disability of other parties in the value chain responding to disruptive innovation in time. Legal dimension risk refers to the risks caused by violation of the relevant laws making enterprises into legal disputes or the risks caused by other legal disputes even though the enterprises do not violate the law.

All these risks mention above may lead to disruptive innovation failure or the profit far lower than expected.

3. Construction of the Evaluation Index System

A. Evaluation Index System

The risk factors from 7 dimensions collected by the method of literature analyzing, make up the primary index set. An expert group is set up, consisting of 5 experts who are (or had been) engaged in disruptive innovation, 5 experts who research on disruptive innovation theory, and one management consultant. By the method of Delphi, the indexes in primary index set are revised according to the advices of the expert group. Ultimately, the evaluation index system is established, including 7 first class index and 29 second index, shown in Table I.

B. Characteristic of Evaluation Index

The disruptive innovation risk evaluation index system shown in Table I contains general indexes that perform similar to those in traditional innovation [6,7], such as cash affluence, error in project selection, market positioning etc.

TABLE I Evaluation Index System

First class	Second class
Technology dimension	Technical ability
	Technical difference
	Technical difficulty
	Time cost in technology R&D
	Money cost in technology R&D
Management dimension	Management ability
	Staff outflow
	Team coordination
	Leadership qualification
Rival dimension	Intensity of competition
	Capacity of competitor
	Competitiveness of innovation
	Developing stage of the market
	Occasion to enter in the market
Consumer dimension	Consumer acceptance
	Consumer conservatism
	Change in demand
	Satisfying marketing
	Enterprise influence
Value chain dimension	Harmony in cooperation
	Communication
	Availability of suited resource
	Rationality of choosing alliance
Legal dimension	Legality
	Legal dispute
	Dynamics of macropolicy
Other dimension	Cash affluence
	Error in project selection
	Market positioning

Meanwhile, there are also some indexes that measure the prominent disruptive innovation risks caused by the specialties of disruptive innovation. Specifications of these indexes are as follows.

1) *Indexes that measure the risks caused by “disruptiveness” of disruptive innovation.*

The “disruptiveness” of disruptive innovation performs in three aspects: disrupting the existing technology or product, disrupting the existing consumption attitude, and disrupting the existing market pattern. So, evaluation indexes should be able to measure the prominent risks caused by these three aspects.

To disrupt the existing technology or product, disruptive innovation should be different from the exist one and be competitive [7]. In order to be competitive, in high-end disruption, disruptive innovation should be superior to existing technology or product, while in low-end disruption, it should be inferior to and cheaper than existing technology or product. The corresponding indexes are “Technical difference” and “Competitiveness of innovation”. And on the other hand, owing to the disruptiveness, there are many consequences that may cause risks. For example, disruptiveness enhances the difficulty in technical R&D, impedes the availability of suited resource. The corresponding indexes are “Technical difficulty” and “Availability of suited resource”.

To disrupt the existing consumption attitude, not only should the innovation itself be disruptive, but the marketing strategy should also be particular and applicative. If marketing is satisfying, it may guide consumers to buy the new products efficiently. The corresponding index is “Satisfying marketing”.

Moreover, the effect of disruptiveness of consumption attitude also depends on consumers’ uncertain behavior, including the index “Consumer acceptance” that reflects the degree to which consumers accept new things and the index “Consumer conservatism” that reflects the degree to which consumers reject new things.

To disrupt the existing marketing pattern, disruptive enterprise finally should displace the incumbent firm or grab the market share of the incumbent until the two sides reach the equilibrium. Therefore, there is no doubt that incumbent firm and potential competitors will beat back to the disruptive innovation, which may bring high risks for disruptive innovation. The indexes that inspect this kind of risk are “Intensity of competition” and “Capacity of competitor”.

2) *Indexes that measure the risks caused by “opportunity” of disruptive innovation.*

It is necessary to grab some certain opportunities to realize the disruptive innovation. These opportunities may be derived from the extend environment or from the enterprise itself.

The opportunities derived from the extend environment can be measured from several aspects. E.g. the stage that the existing market is in, studies show that it is the best time to carry out disruptive innovation at the maturation stage and the degenerating stage, when the risk is the lowest [3]. E.g. the demand of disruptive innovation products among non-mainstream consumers, the stronger the demand is, the lower the risk will be. The corresponding indexes are “Developing stage of the market” and “Change in demand”. The opportunities are also derived from national macro policy that may bring not only opportunities but also risks to disruptive innovation. The indexes to measure these risks are “Legality” and “Dynamics of macro policy”.

The opportunities derived from enterprise itself include three aspects. The first is the breakthrough in technology, like overcoming the key technology, buying an important patent or establishing alliance with important technology supplier. Corresponding indexes are “Technical ability” and “Rationality of choosing alliance”. The second is the occasion to entry nonmainstream market. Corresponding index is “Occasion to enter in the market”. The third is the courage and insight of the leadership, e.g. Apple’s Steve Jobs, Alibaba’s Jack Ma, 360’s Zhou Hongyi. Corresponding index is “Leadership qualification”.

C. *Weight of Evaluation Index*

The evaluation index system constructed in this paper contains lots of indexes, which makes it is not suitable to use the method of AHP to weight the indexes, for the reason that the calculation will be huge and there will be error in consistency check. However the method of sequence relations is more suitable. There is no limit to the number of indexes, and it doesn’t need to check the consistency, which will significantly reduce calculation amount. So this paper selects the method of sequence relations to calculate the index weight. Specific steps are as follows:

- Based on some certain criterion, the evaluator selects the one that he thinks is the most important among evaluation indexes $\{x_1, x_2, \dots, x_n\}$, mark it: y_1 . Then selects the most

important one in the rest, mark it: y_2 . Repeat this $n-1$ times until there is only one index remains, mark it: y_n . So the sequence relations are $y_1 \succ y_2 \succ \dots \succ y_n$.

- Assign the value for r_i . If y_{i-1} is as the same important as y_i , then $r_i = 1.0$. If y_{i-1} is extremely more important than y_i , then $r_i = 1.9$. Otherwise, r_i values between 1.0 and 1.9.
- The weight of y_n is calculated using (1) and then $y_{n-1}, y_{n-2}, \dots, y_1$ are calculated one by one using (2). According to corresponding relation between x_i and y_i , (w_1, w_2, \dots, w_n) is calculated.

$$w_n^* = \left[1 + \sum_{i=2}^n \prod_{t=i}^n r_t \right]^{-1} \quad (1)$$

$$w_{t-1}^* = r_t w_t^*, \sum_{t=1}^n w_t^* = 1, t = n, \dots, 3, 2 \quad (2)$$

4. Evaluation Model

In actual decision, the subjective results made by decision makers may be high or low, good or poor, which makes it hard to accurately describe the value of every index quantitatively. Fuzzy comprehensive evaluation is the method that able to make up for this shortage, and it is widely used by scholars in their researches. So, in this paper, fuzzy comprehensive evaluation is chosen to be used building the disruptive innovation risk evaluation model. Specific steps are as follows:

- Construct valuation set $V = \{V_1, V_2, \dots, V_n\}$
- Assess the single factor fuzzy evaluation matrix $R_i = (r_{i1}, r_{i2}, \dots, r_{im})$. r_{ij} refers to the membership degree of U_i to V_j .
- Use MOMM(“ \wedge, \vee ”) to calculate the fuzzy matrix by (3).
- $B_i = W_i \circ R_i$ (3)
- Assess score for each valuation $C = \{C_1, C_2, \dots, C_n\}$, from “very high” to “very low”, that is from 5 to 1. Calculate the comprehensive score by (4), which reflects the overall level of the evaluation object.

$$G = B \cdot C^T \quad (4)$$

5. Case Study

The disruptive innovation product Yu'eobao is taken as an example to verify whether the risk evaluation index system and risk evaluation model constructed in this paper is rational and operable.

A. Overview of Evaluation Object

On June 13, 2013, the third-party payment platform Alipay and the fund institution Tianhong jointly launch the product for individual users named Yu'eobao. The balance in Yu'eobao account can not only bring in some profit, but also can be used for payment any time, which gives users great convenience. Until February 27, 2014, the number of Yu'eobao users has reached 81 million, and is still growing rapidly.

Yu'eobao is a disruptive innovation product that connects electronic payment and fund finance, the disruptiveness of

Yu'eobao mainly shows in following aspects:

1) *Yu'eobao provides new value propositions to non-mainstream market.*

Yu'eobao not only focuses on profitability that is the value proposition of the mainstream market, but also creates new value propositions, e.g. a low-threshold and convenience. Considering the marginal cost, traditional finance institutions have to set a high bottom line of purchase, e.g. 50 thousand yuan. A lot of people are unable to afford. These people make up a big low-end market which Yu'eobao aims at. Yu'eobao doesn't set a bottom line, meanwhile can give a high profit to users. So, most people are glad to choose using Yu'eobao to manage their money. In addition, users can use Yu'eobao on line, instead of going to a certain place at a certain time when buying traditional fund. Yu'eobao saves users' time. When more and more people choose to use Yu'eobao, it may disrupt the mainstream market.

2) *Yu'eobao gives users a novel user experience.*

Yu'eobao calculates user's profit by compound interest and lets user to see the change of interest rate and his profit every day. It is an excellent user experience, especially for modern young people whose income is not high. A little profit can bring them a lot of satisfaction.

3) *Yu'eobao has both payment and financial management function.*

Yu'eobao is bound to Alipay. The balance of the two accounts can transfer any time. Meanwhile, the balance of Yu'eobao can also be used for payment that makes it having the function of payment. It is disruptive both in finance and payment field.

However, Yu'eobao is also risky. It has been controversial since it was launched. The risk factors are as following:

1) *Monetary market:* The balance of Yu'eobao is used to buy the fund of Co. Tianhong. When the monetary market performs poor, the users' profit will decline correspondingly. When users realize their profit decline, they may turn to other finance product that is safer and more profitable. Then Yu'eobao's capacity of accumulating money will decline so that Co. Tianhong have no enough money to negotiate with banks on the interest of agreement saving facilitating the users' profit decline farther, which makes Yu'eobao into a dilemma.

2) *Competition from banks:* Banks are the most important competitor of Yu'eobao. Banks' finance management product, fixed time deposit, and current deposit are all the alternative competitive products of Yu'eobao. If banks improve these products in order to be superior to Yu'eobao, or launch banks' own “Yu'eobao-alike” product, there will be a serious effect on Yu'eobao.

However, Yu'eobao still has to cooperate with banks as far. Only those consumers who have a bank account can transfer their money into Yu'eobao account. And banks would like to cooperate with Yu'eobao to increase their user amount. In this cooperative game, banks behavior brings Yu'eobao a lot of risks.

3) *Competition from alike products:* There are many “Yu'eobao-alike” products emerging now, among which

WeChat's product Licaitong arouses the largest impact. No matter comparing the technical and capital support, or the accumulative users, Licaitong is not inferior to Yu'eobao. Yu'eobao is faced with great challenge.

4) User dispute: The external form of Yu'eobao account is the same as Alipay when it is used to pay, which causes illusion to most users. They are not aware of the internal form of Yu'eobao account is equal to buy the fund and it is risky. Once users dispute with Yu'eobao on fund profit and risk problem, it is hard for Yu'eobao to handle.

5) Regulation: According to the regulation of people's bank of China on third-party payment platform management, the third-party payment platform can use the balance of users' accounts to buy agreement saving, and the interest belongs to third-party payment platform. But there is not any state to explicitly stipulate whether it can be used to buy fund. To some extent, the legality of Yu'eobao is controversial. The regulator's attitude toward Yu'eobao is still unclear, Yu'eobao still exists the risk of termination.

B. Evaluation Process

Data and information of Yu'eobao were collected by all means, such as literatures, Internet news, public performance reports of Yu'eobao, statistical analysis report from third-party institution (Analysis International), blogs and weibos of Yu'eobao executives, and field research. Combining with the collected data and experts' advices, the evaluation of each index is completed. Each index is weighted with the method of sequence relations as state above, specific shows in Table II.

TABLE II Evaluation Index Weight

First class	Weight	Second class	Weight
Technology dimension	0.3453	Technical ability	0.3264
		Technical difference	0.2512
		Technical difficulty	0.1495
		Time cost in technology R&D	0.1794
		Money cost in technology R&D	0.0934
Management dimension	0.1041	Management ability	0.2419
		Staff outflow	0.4355
		Team coordination	0.1613
		Leadership qualification	0.1613
Rival dimension	0.1354	Intensity of competition	0.0891
		Capacity of competitor	0.1337
		Competitiveness of innovation	0.2499
		Developing stage of the market	0.2999
		Occasion to enter in the market	0.2272
Consumer dimension	0.2302	Consumer acceptance	0.2646
		Consumer conservatism	0.2646
		Change in demand	0.2205
		Satisfying marketing	0.1575
		Enterprise influence	0.0927
Value chain dimension	0.0572	Harmony in cooperation	0.3043
		Communication	0.2766
		Availability of suited resource	0.2515
		Rationality of choosing alliance	0.1676
Legal dimension	0.0801	Legality	0.3834
		Legal dispute	0.3485
		Dynamics of macropolicy	0.2681
Other dimension	0.0477	Cash affluence	0.2667
		Error in project selection	0.2933
		Market positioning	0.4400

$$R = \begin{bmatrix} 0.1 & 0.1794 & 0.2512 & 0.2512 & 0.3264 \\ 0.4 & 0.3 & 0.2419 & 0.2 & 0.1613 \\ 0.1337 & 0.2 & 0.2999 & 0.2999 & 0.2999 \\ 0.2 & 0.2 & 0.2205 & 0.2646 & 0.2646 \\ 0.1676 & 0.3 & 0.3043 & 0.2766 & 0.1 \\ 0.3485 & 0.3 & 0.2 & 0.2 & 0.1 \\ 0.1 & 0.2 & 0.3 & 0.2 & 0.2667 \end{bmatrix}$$

The result of first class fuzzy evaluation is

$$B = W_B * R = (0.2, 0.2, 0.2512, 0.2512, 0.3264)$$

The result after normalized processing is

$$B^* = (0.1628, 0.1628, 0.2044, 0.2044, 0.2656)$$

The comprehensive score of Yu'eobao's disruptive innovation risk is calculated: $S = B * C^T = 2.7528 \in [2, 3]$, so the risk level of Yu'eobao belongs to "low".

6. Conclusion

The risk evaluation index system constructed in this paper highlights the characteristics of disruptive innovation risk. When used in disruptive innovation risk evaluation, it is more applicable and accurate than the general risk evaluation index system.

In case study of Yu'eobao, this paper analyzed the disruptiveness and risk of Yu'eobao and evaluated its risks, and verified that the index system and evaluation model are rational and operational.

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