New Industry Entry Decision based on Risk Decision-Making Model

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Abstract: With the rapid development of the world's economy, many companies have to face new challenges. Thus, a few of them decide to leave their initial industry and try to explore new industry, trying to find new profit growth rate. However, during the process they encounter many potential risks. In the end, some of them may disappear from the market. This paper focuses on new industry and the characteristics of its entry process. Based on the thought of queuing theory, risk decision-making model of new industry entry is constructed. Due to this model, the instant expected profits and the optimal entry occasion of a company entering new industry during different periods is concluded. Combined with its risk preference and strategic goals, the entry behaviours of a company are analysed. Finally, the countermeasures after entering new industry of a company are dissected. The aim of this paper is to help companies to avoid risk entering new industry rationally.

Keywords: New industry entry, queuing theory, risk decision-making.

1 Introduction

Faced with great pressure from market competition and fierce competition of internal industry, many companies choose to enter new industry for higher operation profit, which is mainly limited to low industry profit and poor ability for developing industry profit space. However, there are many uncertainties in new industry, so some companies' forecast of new industry may show differentiations from reality, which can lead to failure entering new industry. Thus, building scientific decision-making model of new industry entry, weakening the influence of uncertainty, reducing risk of new industry entry and providing decision-making basis for a company entering new industry can be both meaningful for theory and practice.

Quantities of domestic and overseas experts have never stopped researching decision-making theory of new industry entry. According to entry barriers theory, these barriers to entry can be the fundamental condition of imperfect competition market structure. If none entry barriers exist, every company is able to freely enter or quit one kind of market. Thus, the market can reach the perfect competition condition or competitive condition (the latter was another ideal standard of market structure proposed by Baumohl in 1982). Although entry barriers are one of most significant factors affecting market structure, they did not appeal economists'

attention until the 1950s. Ben did groundbreaking research on these in 1956, which started to cause boom on barrier theory research in industrial organization. Cournot, Antoine Augustin (1801-1977) first raised game theory in duopoly model. In 1944, Von Neumann and Morgenstern established the game theory basis in coauthored book <Game Theory and Economic Behavior>. With the development of game theory, kinds of scholars put it into use in decision-making study. In the theoretical research on industrial structure, Michael Porter constructed five forces model, who thought industrial competitors, potential intruders, substitutes, suppliers and buyers decided the earning power of the industry. And the theory provides theory basis for decision-making on industry entry.

2 The process of new industry entry

Making reasonable and scientific entry decision needs to combine with the entire entry process, but not focuses on single activity. The process of a company entering new industry can be concluded as following four stages: (1) Searching stage, when decision-makers transform deciding industry to searching target one. During this period, a company should search and appraise some new industries, and which can be fit for entry standard is listed the new target industry. (2) Preparing stage, when

decision-makers should investigate, collect and handle the information of the new industry a company plans to enter. Owing to this, new industry can be determined. This period can be least apperceive and many potential entrants decide not to entry new industry at the finishing of preparing period. (3) Entering period, when a company self-positions after making entry decision. The company begins to open up new products and markets so as to foothold in new industry. (4) Extended period, when company's strategic focus moves from entry strategy to long-term strategy. With the development of the process, the exit barriers are raising. The focus of what a company should consider is on whether continuing or increasing investment to keep the profit growth in the new industry.

3 Decision-making model of new industry entry of a company

3.1 Expected profit of new industry entry

Suppose the forecast of target industries the company searches has only two results: expected forecast and unexpected forecast, α represents the probability which actual situation of new industry is the expected forecasting result and queue length L shows the total number of companies in new industry; Li reflects the ith company's capability sort in new industry. Then expected profit v_i of the ith company can be calculated as following:

$$v_i = \alpha F(L, L_i) \qquad (1)$$

$$\frac{\partial v_i}{\partial L} = \frac{\partial F}{\partial L} < 0 , \quad \frac{\partial v_i}{\partial L_i} = \frac{\partial F}{\partial L_i} < 0 \text{ and } \frac{\partial v_i}{\partial \alpha} > 0 \text{ can}$$

be supposed.

λ can be defined as the rate of company entry, and μ can be defined as the rate of company exit. Setting the initial queue length of the ith company searching new industry is L_0, time interval from searching to entering new industry is t_i, and time interval from searching new industry to recent is T_i, it can be concluded that:

$$L = L_0 + (\lambda - \mu)T_i \qquad (2)$$

$$L_i = L_0 + (\lambda - \mu)t_i \qquad (3)$$

$$\alpha = g(s), s = \phi(t_i) \qquad (4)$$

Then putting (2), (3), (4) into (1) can get vi, which is a function related with T and t_i:

$$v_i = G(T_i, t_i) \qquad (5)$$

According to (5), instant expected profit of company entry at anytime and different period after entering can be obtained.

3.2 Optimal entry occasion of a company

On the one hand, if it is too early to enter, lack of information can lead the company to wrong decision; on the other hand, that it is too late can let the company fall behind and gain low profit in the new industry, which is harmful for subsequent work development. To sum up, choosing the right to enter is crucial. The moment when decision makers determine to entry the new industry is $T_i = t_i$, $L = L_i$ and according to (5), expected profit of this moment is a t_i function. When t_i is infinitesimal along with minimal, entry risk of the company is quite large and expected profit is infinitesimal. As time goes on, expected profit starts to increase and the number of entrants becomes bigger. What's more, the expected profit declines again until the entrant number extends to some degree. It can be easily known that equation (5) has maximal value, and let

$$\frac{dv_i}{dt_i} = 0$$

the best occasion t* when the company's entry profit is maximum can be easily gotten: thus solve the equation:

$$\frac{dv_i}{dt_i} = \frac{dv_i}{d\alpha} \cdot \frac{d\alpha}{dt_i} \cdot F(L, L_i) + \alpha(\frac{\partial F}{\partial L} \cdot \frac{\partial L}{\partial t_i} + \frac{\partial F}{\partial L_i} \cdot \frac{\partial L_i}{\partial t_i}) = 0 \qquad (6)$$

$$\frac{d\alpha}{dt_i} = \frac{d\alpha}{ds} \cdot \frac{ds}{dt_i} > 0 \quad , \quad \frac{dL}{dt_i} = \frac{dL_i}{dt_i} = (\lambda - \mu) > 0$$

can be supposed (when new industry reaches stable situation, λ>μ).

3.3 The company and its decision-making behavior

The basic discriminant that reflects decision makers determining to enter a new industry is defined: the expected profit v of new industry entry is larger than that v0 of current industry, thus v> v_0. At the same time, the company's decision-making is also affected by many entry factors, such as risk psychological types, companies' entry strategy, current industry and potential development of entry industry. Owing to this, the company may not choose optimal occasion t* to enter. Some even enter new industry when v<v_0 is satisfied.

(1) The company's risk preference and entry decision-making

Seeking for higher risk gains is goal guide of adventure type of companies. In addition, under the

influence of taking a profiteering attitude, decision-makers will magnify, who think information amount can increase more rapidly as time goes on. And according to the solution to equation (6), optimal entry occasion becomes smaller, which means riskers will choose to enter new industry in advance, compared with risk neutral decision-makers. These riskers make every effort to obtain higher profit, advantageous position and advancers' advantage.[8]

On the contrary, the goal orientation of conservative decision-makers is to avoid risks to a large extent. Slow and steady mind makes the conservative relatively narrow, and they believe that the best time to enter is when the new industry information is in complete state. According to equation (6), the best entry occasion is getting extended, and the conservative will delay entry occasion compared to the other entrants, in order to reduce the cost of trial and error to enter.

(2) Decision-making analysis of when expected entry profit is smaller than current industrial profit

Putting v_0 into (5), the earliest entry occasion t_L and the latest one t_H of the company can be gotten. And when entry occasion t is between t_L and t_H, the company's expected entry profit is larger than that of current industrial profit, that's $v>v_0$.
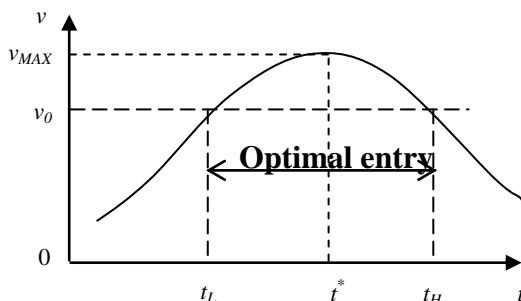

Chart 1 General review of the company's optimal entry occasion choosing

As it is shown in Chart 1, assuming that the company's expected entry profit curve is parabola (different industries may be different), the best occasion region for the company to enter can be determined. As v is the instant expected profit and the new industry is dynamic, some decision-makers do not weigh short-term profits and choose to enter in the condition when $v<v_0$ is satisfied. Decision-makers believe that the development of new industries have great potential, which is stability and slow. Thus the company can change their competitive position and continue to obtain profits higher than v_0 by capital investment, technology innovation, new market development and other ways. As it has a high risk when the company enters in the condition when $v<v_0$ is satisfied, the company choosing to enter in this period usually has a strategic vision, scientific management methods, great strength, and extensive experience in entering new industry.

4 Countermeasure analysis after new industry entry

Assuming that there is a complete information status for companies entering a new industry, the information is no longer profitable, and the profit for the new industry company gain is $v = F(L, L_i)$. The basic way for companies improving its profits is to reduce the number L of new industry companies, and to improve its competitive advantages in the industry, reducing L_i. Thus, there are two basic countermeasures after company entered.

4.1 Countermeasure analysis for decreasing L

(1) Increasing the entry barriers

Companies may establish defense league within the industry to capture highly profitable market, and set low profit market trap, in order to force the new entrants to face the existing and to improve the entry of market development costs. Companies may also play its first mover advantage to set a stable and efficient supply chain system with best supplier and purchaser, such as signing exclusivity contract, cutting off the best supply chain of raw materials, labor and any other resources for new entrants. Economy scale could also be applied in the fields of advertising and technology innovation, which may be achieved by increasing advertising expenses and speeding up the updating of technical renewal. Then, the new-ins have to afford the same advertising and technology costs based on its current small scale, thus, the potential or new entrants have to realize that it may need huge advertising and technology investment to switch consumers' loyalty and preferences for existing or creating their own new consumer. The difficulty of financing and high risk of advertising investment is set as the big barriers to the potential or new entrants entering the target industry.

(2) Decreasing the profits for entrants

It requires existing company deliberately reducing short-term profits to ensure long-term profit possibility in order to effectively prevent the

potential entrants, which means that existing companies have to reduce prices or increase discount to lower entrants' profits. The forecast of target industries in the company is the key point of making decision. The defender may influence the profit forecast of entrant by filtering adverse information to the public, in order to urge the entrant entry decision. The above countermeasures could reduce the entry rate of λ, and increase the quit rate μ. The company profit increased by formula (2) can be known that L decreases.

4.2 Analysis on improving competitiveness

(1) Market Development

In the current market, it is not a wise choice to have frontal competition with the companies with bigger industry competitiveness. The company must have its market analysis and forecast structure to the potential market in order to identify target market. The industry market structure could be adjusted in the process of constantly developing new market, thus changing the industry competition structure.

(2) Differentiated marketing

Differentiation is the most important way to surpass the competitors. The company can gain differentiated competitive advantages and improve the competition position by continuous product development and technology innovation.

(3) Economy scale

Huge investment of funds, human resource and materials make economy scale of the company possible. Compared with other companies within the industry, greater cost advantages could be gained, as the needed investment in the industry has been shared by the scale of the company. Improving L_i is the basic way for the company to increase profit, as no matter whether a new industry tends to stable or not, which implies L changing or not. Companies in greater competitive position obtain higher rival profits.

5 Conclusion

The company usually makes entry decision based on the expected profit obtained when it enters

$$\frac{dv_i}{dt_i} = 0$$

a new industry. Let , the best entry occasion t* can be gotten. The company could receive the most expected profit at the moment t*; the

fundamental discriminant of company entry is $v > v_0$, that means when the expected profit v the company obtains is larger than recent industrial profit standard v_0, the result is the occasion the company enters is between the earliest entering moment t_L and the latest entering moment t_H. Because of the different risk and entering strategy of a company, it often does not choose t* to enter, and even grabs the moment when $v < v_0$. Thus, the new industry profit can be changed by the behavior after entering. As it demonstrates in this paper, profit value after the company entering is related to company numbers L and strength sort L_i. Basic countermeasure to increase profit is to lower L and enhance competitive position L_i in the new industry.

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