

Research on Development Status Matrix of Technology-based SMEs Sustainable Development

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Abstract. Technology-based SMEs are important for the realization of innovative nation. In growth stage, Development Status Matrix of Technology-based SMEs' Sustainable Development consist of two variables—strategic planning and performance appraisal. Technology-based SMEs shall combine these two variables together. Because when the strategy of an enterprise is clear and performance appraisal is stimulating, the enterprise shall continuously develop.

Technology-based SMEs have great vitality. Besides, the government has introduced many policies to promote the development of these enterprises and lay a foundation for them as well. The sustainable development, the focus of businesses, is necessary for Technology-based SMEs to grow strong.

Summary of Small and Medium-sized Technology Enterprises Life Cycle

Enterprise life cycle theory is established by American management scientist Ichak Adizes. Now, we generally divide an enterprise's life cycle into four stages—Startup Stage (include Seed Financing and Early Stage), Growth Stage, Mature Stage and Decline Stage (or Transformation Stage). The life cycle of Technology-based SMEs has the same partition.

In Startup Stage, Technology-based SMEs run a greater risk than Service Enterprises. In Growth Stage, the enterprises are developing rapidly. In Mature Stage, they grow slowly. Then, in Decline Stage/Transformation Stage, Technology-based SMEs are facing enormous challenge. If the organization is successfully transformed, the enterprise shall enter a new life cycle and become a large one; if not, it will decline and end up in failure. This thesis focuses on the Growth Stage.

It is a stage of high-speed growth for Technology-based SMEs that successfully transformed. The enterprises' core products are gaining market recognition, along with the increasing market shares and profits. As the scale of enterprises expanding, there would be a clearer division of labour in the organization than before, which in turn requires a great deal of talents. Except scientists and engineers, marketers, operation managers, accountants and other talents are also important for the management and development of the enterprises.

In Growth Stage, the risks in financing and technology of Technology-based SMEs are reducing, but marketing and management risks are raising. That is because the main founders of this kind of enterprises are engineering researchers with poor management abilities. The management risks include failure to communicate between shareholders and managements, unscientific strategic planning, incomplete management system and unreasonable performance appraisal. With a certain amount of market share and profit, the founders have faith in the future development of enterprises. However, if they can not make reasonable strategies and performance appraisal system, difficulties would emerge in enterprises' operation. Technology, marketing and management are the three "carriages" that carry enterprises in growth stage into the road of sustainable development. Only when the basic management work is completed can the enterprise motivate the study of technology and satisfy the needs of customers. The research on enterprises' development status can help managements grasp principal contradictions efficiently in growth stage.

The Development Status Matrix of Technology-based SMEs' Sustainable Development in Growth Stage

The growth of Technology-based SMEs rely on enterprises' sustainable innovation abilities. The two core variables that ensure enterprises' sustainable innovation abilities are strategic and performance appraisal. Strategies are the guidance of innovation; performance appraisals are the motivation of it. The Growth-term Development Status Matrix of Technology-based SMEs' Sustainable Development consist of two variables—strategic and performance appraisal. The vertical axis of the Matrix represents strategy's clarity, and the lateral axis stands for performance appraisal's incentives. The Matrix is illustrated in figure 1. It can simplify the complicated development system without losing its scientificity and guidance.

Strategy	Clear	Dilemma	Sustain
	Ambiguous	Decline	Preserve
		Unmotivated	Stimulating
		performance appraisal	

Figure 1. The development status matrix

The clear strategies, which rest with the Board's and senior management's decisions on economic climate changes and daring to fit in, refer to the reasonable recognitions and judgements that an enterprise has on goals, paths and plans for development in the next 5 to 10 years. As the economic climate changes, we should pay more attention on consumers' changing demands and whether the enterprises can provide clients with the products and services that meet their requirements. On the basis of judgements, the enterprise has clear strategies on investment, organization's transformation and the nodes of important plans. The criteria of strategies' clarity reflect in three aspects—acclimation, clear objectives and paths.

The incentives mean plans for performance appraisal that based on strategy to motivate employees to improve their professional skills, knowledge and professional qualities. In order to increase workers' willingness to devote themselves to enterprise's development, the enterprise should properly reward them. The difficulty for management is to design incentive plans for performance appraisal according to different positions. SMEs need to find creative solutions by using the flexibility of its mechanism.

According to the incentives of performance appraisal and the clarity of strategy, we can divided the Growth Stage of Technology-based SMEs into the following four conditions:

1. Decline: With ambiguous strategies and unmotivated performance appraisal, employees would have no prospect for the future and no motivations for work because of the unreasonable performance appraisal, which in turn would lead the enterprises into an inevitable failure.

2. Dilemma: If the enterprise has clear strategies but lack of unmotivated performance appraisals, it will find that employees' enthusiasms are low. In which case, the enterprise should improve workers' creativities by enhancing internal management and its level.

3. Preserve: If the enterprise has stimulating performance appraisals but ambiguous strategies, due to employees' high enthusiasm, the negative effects of strategic errors won't emerge in a short time. Therefore the enterprise can maintain the current condition.

4. Sustain: In this condition, the enterprise has clear strategies and stimulating performance appraisal. The employees are full of expectations and passions for work. The enterprise will achieve sustainable development.

Main Points of Technology-based SMEs' Sustainable Development in Growth Stage

Within the enterprises, the sustainable development of Technology-based SMEs are macroscopically depend on clear strategy, and microscopically depend on employees performance appraisal.

1. Make Clear Strategies

The key points for Small and Medium-sized Technology Enterprises to make clear strategies is to set up strategy-awareness and strengthen technical innovation to cultivate and form the core competence of enterprise.

(1) Set up strategy-awareness

In startup stage of Technology-based SMEs, due to the survival crisis, managers pay more attention to the short-term interests and benefits. After the tough startup stage, because of the inertial thinking of main managers, it's hard for them to focus on the long-term planning of enterprises' development in the growth stage. They make short-run decisions usually by experience and subjective perception. In the meanwhile, the main managers of Technology-based SMEs are mainly engaged in technical work, as a result, they lack awareness, method and competence of making strategies. In growth stage, it's necessary for the main managers of the enterprise to look beyond and have clear thinking and planning for the next 5 to 10 years. If you are not good at strategy, you can find suitable person for strategy and integrate your own ideas into the planning. To utilize the correct operation strategy, the following aspects must be concerned: first, according to the logical order of the development of things, activities should not violate the basic laws of the development of things; second, make flexible operation strategy to deal with the uncertainty of the future; third, master some necessary external information, analyze them and make reaction.

(2) Strengthen technical innovation, cultivate and form the core competence of enterprise

Core competence is the set of ability of the organization to cope with reform and fierce external competition and defeat competitors. Generally, the core competence of modern enterprises is the combination of certain resources and capacities based on knowledge and innovation, which is what makes enterprises gain a competitive advantage over time.

Innovation is the foundation of competitive advantage. Technological innovation is vital to the survival and development of Technology-based SMEs, which is also the key of cultivating and form the core competence of enterprise. To improve independent innovation capacity, the enterprise must have a higher R&D and capital investment; must have science and technology personnel engaged in products & crafts innovation; must have effective and perfect technical information network, which leads to independent innovation capacity based on the coordinated development of products & crafts innovation ability. Enterprise can also cooperate with scientific research institutes and universities to give full play to the comparative advantage of the two, and achieve steady growth by using external forces to avoid the risk of technological innovation.

2. Establish and improve the performance appraisal mechanism of scientific and technological workers

Performance appraisal is the core work in human resource development and management, which is an important means to mobilize the enthusiasm of employees and managers. The most significant part of technological innovation is scientific and technological workers, whose performance decides the performance of the whole R&D activity of enterprise. Therefore, how to make effective performance appraisal of the scientific and technological workers is the key to achieve the sustainable development of enterprises, as well as to enhance the core competitiveness. However, due to the complexity, creativity and uncertainty of R&D work, performance appraisal is a major difficulty for enterprises. To establish and improve the performance appraisal mechanism of scientific and technological workers is particularly important for Technology-based SMEs.

The appraisal methods of scientific and technological workers should be carried out in a differentiated way concerning actual condition such as position and work team. To stimulate the creativity of scientific and technological workers, enterprises should set different appraisal methods according to different education level and position. Enterprises and scientific and technological

workers must have close communications to find suitable appraisal methods. The result of team appraisal should have certain proportion in personal appraisal, the proportion of which depends on the position and role of the individual in the team. The appraisal period of scientific and technological workers should be decided by the combination of project completion period and the annual appraisal.

The selection of appraisal index should be closely related to the enterprises strategy. The primary principle of establishing the performance appraisal system of scientific and technological workers is that appraisal index must be closely related to the enterprises strategy, and then the indexes of R&D projects should be associated with scientific and technological workers. Eventually, realizing the close union of performance appraisal system and enterprises strategy by giving different proportion to various indexes.

The performance appraisal of scientific and technological workers should focus on both process and result. In the design of the performance appraisal system of scientific and technological workers, the appraisal of the process should be intensified. Adopting the process-oriented methods of target management will standardize research and development activities of enterprises and make it more transparent.

The result of performance appraisal should be combined with short-term incentive and long-term incentive. Short-term incentive is the reward for the work of employees, such as salary and bonus, to meet the material and spiritual needs of real life. Enterprises can also provide medium and long term incentives, such as the distribution of equities, stock options and benefits of scientific and technological achievements, so as to enable outstanding employees to share the rewards of rapid growth. Using medium and long term incentives to form a community of interests with employees can improve employee's satisfaction, enhance their sense of responsibility and mission, and objectively reduce the churn rate of core staff.

Summary

The most active, competitive and innovative Technology-based SMEs play an important role in the realization of innovative national strategies. The substantial development of Technology-based SMEs in the growth stage macroscopically depends on strategy, and microscopically depends on performance appraisal. Enterprises should combine strategic planning with performance management. The goal-setting of performance management should be closely related to the goal of strategic management, which is a significant means to permit its competitive advantage and substantial development.

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