

# Total Innovation Management: A New Emerging Paradigm of Innovation Management

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## Abstract

*The innovation management is the key activity for company, and the innovation synergy mechanism and pattern between technology element and non-technology elements (mainly including strategy, culture, organization and institution) is the core issue for innovation-based organization. The traditional innovation management has provided the innovation synergy pattern between different products, but it limits itself to product innovation. The portfolio innovation management insists on the innovation synergy among technology, organization and culture and oriented to building up innovation competence, has provided more extension and pertinence, but not taken time-space dimension of innovation management into account. Therefore, based on cases studies of the firms home and abroad, a novel paradigm of innovation management—total innovation management (TIM) is put forward in this paper. This new paradigm combines the insights and coherence of the traditional innovation management view with the more relevant portfolio innovation management, and draws on three distinct areas of recent research, namely, the innovation theory of the firm, the resource-based view (RBV), as well as the complexity theory. It introduces the theoretical framework of TIM, and present the context of TIM formation. It holds, particularly, the view that all people are innovators. The paradigm of TIM provides a basis for an upgraded, more unified, and better-attuned view on innovation management field.*

## Keywords

Total innovation management, everyone as innovator, organizational culture

## 1. INTRODUCTION

Since 1990s, the turbulent environment, the increasing intensity of market competition, and customer's increasing demand on individualization, time to market and uniqueness, have put forward new challenges to enterprises. More and more enterprises find that innovation is becoming the critical source and driver for enterprise's survival and development. Past practices also proved that it's not enough to focus on technological context of innovation, some non-technological factors, such as the organizational structure, cultural characteristics, market context, the strategy of innovation, and management style,

et al., may also have important influence on innovation performance.

Based on the review of literatures about evolution of innovation management and case studies of two Chinese top enterprises, Haier Group and Baosteel, the authors argue that, to win the competitive advantage in the ICTs (Information Communication Technologies)-driven new economy, innovation must be systemic and all-around, and correspondingly put forward the concept frame of Total Innovation Management (TIM)—A Pentagon model.

According to this study, it is very necessary for enterprises to transform from traditional paradigm of innovation management to the new paradigm of total innovation management, by which to face the challenge of violent market competition and individualized user's demands. The authors believe that grasping the marrow of TIM and putting it into practice is the crucial way at present for Chinese enterprises to win the sustainable competitive advantage in the violent market environment.

The author hope that the bringing forward of TIM can greatly raise the upsurge of total innovation in enterprises, making the view of total innovation rooted in everyone's hearts, and make innovation indispensable ability and DNA of every department and every employee.

## 2. REVIEW of the EVOLUTION of INNOVATION MANAGEMENT

Generally speaking, the practice of innovation management has gone through two stages, and accordingly, there have been two basic paradigms for innovation management (Figure 2), as follows:

### 2.1 The traditional technological innovation-centered management (Single Technological Innovation Management).

Before 1980s, the dominant paradigm of innovation management is traditional technological innovation-centered, which mainly focus on the technological dimensions of innovation, namely product innovation or process innovation. At this stage, the center task of enterprises' innovation management is to pay too much attention to product innovation or process innovation separately, regardless leverage the percentage of product and process. The well-known U/A paradigm (Utterback and Abernathy, 1976) is just an example of this stage. The main

characteristics of it are that, it concentrates on products innovation first, then pays more attention to process innovation, and finally reaches the steady balance between product innovation and process innovation. What's more, the innovation activities only depend on the R&D function and R&D people, other sources of innovation are generally ignored. It is more suitable for developed countries that are powerful in R&D (Cooper, 1998).

## 2.2 Portfolio innovation management.

Portfolio innovation is the important base and approach of realizing overall benefit of technological innovation, which is key to win sustainable competitive advantage. This paradigm was developed and popularized by a group of scholars in American advisory company of Stanford University (SDG) and institute of management science & strategy of Zhejiang University. At present, it is the dominant paradigm for innovation management both home and abroad. The researches and practices of portfolio innovation have passed through four stages (see Figure 1):

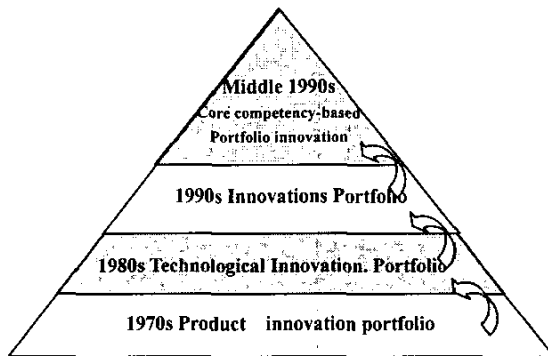


Figure 1. Evolution of portfolio innovation management

In recent years, based on the theory of portfolio innovation management, the innovation theories are developing towards a higher level, and many scholars are conducting innovation theory research based on ecosystem theory, the TIM such as innovation by everyone, at any time, in all the processes, among different functions and around the world is the next phase research's focus. In recent years, the ideas of inspiring each employee's creativity and actualizing the idea that everyone is the innovator are considered by lots of theoretic researchers (Tucker, 2002; Peters, 2002; Shapiro, 2001; Wheatley, 2001; et al). Roger Bean (2002) pointed out that innovation should be considered as a business and the innovation should take place at every aspects. Shapiro (2002) indicated that enterprises should try to realize innovation at 24/7 in order to timely responsiveness to the needs of customers due to the fierce competition and the more rigorous requirement of customers. Some scholars think that the emergence of new organization form such as outsourcing and strategic alliance have advanced the globalization of R&D, manufacture and marketing etc. (Chowdhury, 2003).

## 3. FRAMEWORK of TIM and ITS CHARACTERISTICS

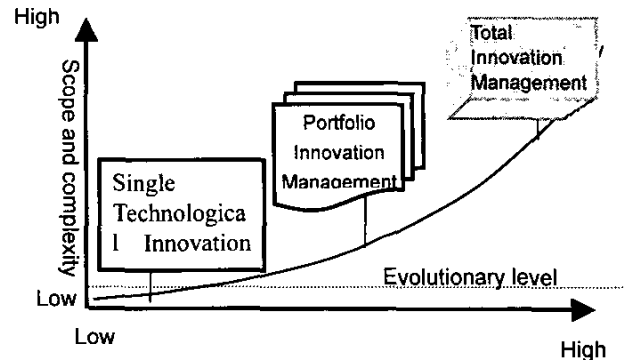


Figure 2. Evolution of Innovation Management

There are three layers on total Innovation: 1) it involves innovation in all functional area, as innovative key element. Including organizational, cultural, institutional, process, etc., 2) it covers the whole space-time dimension and continuous innovation in every department by, everybody (all as innovators), at anytime to innovate, including the whole value chain innovation; 3) the innovation synergy among innovative elements. The remarkable difference between the traditional management of innovation and total innovation is that it breaks through the past framework of innovation confined only in R&D department.

What is the essence and objective of TIM?

Total Innovation Management (see Figure 3)

- Aim at winning the sustainable competitive advantage (value added);
- Focus on accumulating and improving the core competency (as core competency not limited to technological ones).

With the proper mechanism and tools, TIM makes innovation pervasive and perpetual throughout the organization, which means that innovate by everyone, at everywhere, on everything, and at any time.

### 3.1 Dimensions of TIM inherent elements

*Strategy innovation is the blueprint.*

Due to the increasing turbulent and uncertainty environment that enterprises faced, the strategy should keep relatively stable with flexibility. According to the changes of internal and external environments, enterprise's strategy should be shifted timely and kept in dynamic balance.

*Technology innovation is the key.*

Technology innovation is the key source for enterprises to accumulate core competence and accordingly to obtain the competitive sustainable advantage. So total innovation management must regard technology innovation as the key and foundation (Obviously, as to service enterprises, service innovation is the key).

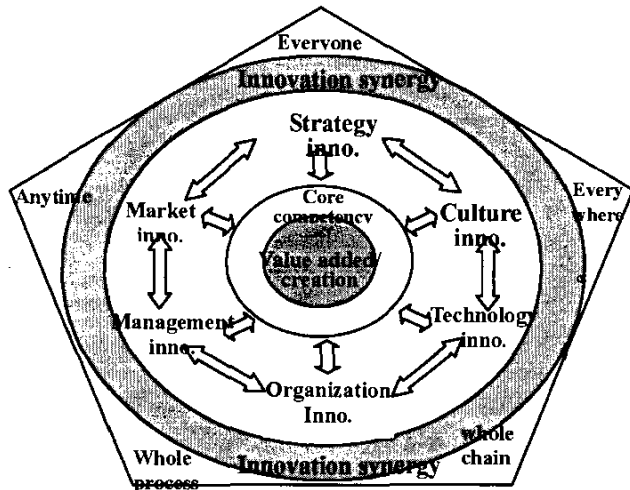


Figure 3. The pentagon model of TIM

(Source: Qingrui Xu, Gang Zheng, et al. Towards Capability-based Total Innovation Management (TIM): The Emerging New Trend of Innovation Management—A Case Study of Haier Group, ISMOT&ICMIT'02 Proceedings. Zhejiang Univ. Press, 2002.)

**Management innovation is operational base.**

It refers to the innovation of managerial theory, thought, paradigm, mechanism, and tools, et al. For example 6 Sigma management mode of GE is one of typical management innovation. OEC and SST are successful management innovation in Haier.

**Organization innovation is structural pledge.**

With expansion in scale, the traditional pyramid structure will cause overstaffed in organizations, low efficiency, and slow responsive speed. It will ultimately influence the innovation performances and market competitiveness. Organizational structure must be adjusted correspondingly according to the demand of innovation.

**Thoughts and culture innovation is precondition.**

The innovation in thought is the prerequisites to carry out the all innovations. If the idea can't change prior to the changed situations, there will be no innovative spirit existed. Strong innovative culture is the key factor which influences the effective and continuous innovation in enterprises. For many famous innovative enterprises in the world at present, for instance, 3M, there is a strong innovative culture of encouraging innovations and tolerating failures.

**Institution innovation is stimulator.**

Institution innovation means innovation of rules and regulations about enterprise's routine, performance evaluating, staff rewards and punishments, salary system, training and promotion and so on. They should innovate timely according to internal and external change of

environment, in order to meet the request of total innovation.

**Market innovation is orientation.**

Market innovation means the innovation of marketing channel, the operational ways et al., by which to create new market, new channel and new ways.

**Innovation synergy is approach.**

Due to the inherent limitation of isolated innovation, it's necessary to integrate all the innovative elements systemically. Synergy of all the innovation agents has becoming the dominant paradigm of innovation management both native and abroad since 1980s, and it's the basic approach to realize TIM.

**3.2 Space-time dimension of total innovation management (see figure 4)**

**Innovating at anytime.**

Fierceness of competition and instant response required by users make innovation must to be available all time and never cease. Enterprises must make every effort to realize 24/7 innovation (namely innovates throughout 7 days of every week, 24 hours of every day) (Stephen M. Shapiro, 2002). Innovative enterprises should encourage immediate innovation (like writers or musicians' improvisation).

**Innovating throughout all processes, all departments, all over the world (everywhere innovation).**

Traditional organizational processes are based on function and specialization, which often lead to processes separate from each other. As a result, no one is responsible for the whole processes, and no one is really responsible for customers. It has become difficult to fit for the customer-centered new economy. With the increasing diversified and individualized demands of customers, innovation should no longer regard as only the function of the R&D department, but all the processes. Only by embodying innovation in each process, could enterprises meet the real demand of customer better.

With the rapid development of economic globalization, E-commerce, networked economy, the border of enterprises is becoming hazier and hazier. The rising of new organizational forms, such as outsourcing, the strategic alliance, and virtual organization, make the border of enterprises crossing over the restrictions of the region, industry and even country, and has promoted the globalization of R&D, manufacture, and marketing etc. A lot of transnational enterprises have set up R&D centers or the base throughout the world and carry on innovation in order to combine global scientific and technological resources, such as Microsoft, Nokia, etc. Nokia Company has 55 R&D centers located in 14 countries, including over 19,000 R&D personnel.

With the evolution of innovation management theory and practice, and the change of market environment, people realize that, no matter how the information network in

individualized demand. For this reason, innovation must break the border of enterprises, integrating users in the innovation system of enterprises, and make them become the important innovative source, by which can really meet users' demands (Eric Von Hippel, 1988, 1993; Stephen M. Shapiro, 2002). Equally, as for all the related resources throughout the value chain, such as suppliers, dealers and other stakeholders, should also be integrated in idea creating, forward R&D and design of products, as important part of innovation system. Practices both native and abroad have proved that, by integrating the S&T resources throughout the whole value chain as innovators, innovation performance can be improved greatly, and the innovation cost can be reduced because of sharing to the whole value chain at the same time.

*Innovating by everyone.*

For implementing innovation at anytime and everywhere, it is necessary to have all the people inside and outside firms to participate the innovation. Life taught us that everyone possesses the capability to deal with complexity and interconnection. Their creativity and commitment are the greatest resources for innovation. Paradigm of TIM requires the universal commitment and participation in innovation. Innovation is no longer the function for R&D personnel alone, but the all employees' behavior. Personnel from sales, manufacture, R&D, to customer service, administration, and financial department, etc., all are the innovation source (Margaret J. Wheatley, 2001).

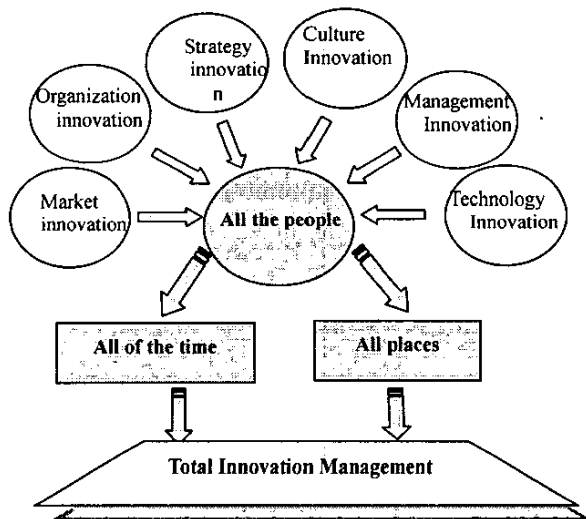


Figure 4. Summarized the Three-All model of TIM (all of the time, all the people, all places).

**4. THE CONTEXT of TIM FORMATION**

As a novel paradigm of innovation management, TIM is a product of the combination of the theoretical development and the required of the innovation practices. Inspired by the thoughts of system and biology, the complex and changeable Internet environment, and the observations of

some leading Chinese firms and famous transnational companies' innovation practices, like Haier, Legend, Baosteel, 3M and HP. TIM studies the systemic model which focuses on the innovation synergy of technology and non-technological innovation, and set up the biological mode which describes the innovation by everyone at any time, and at every field. The context of TIM formation mainly includes the follows:

**4.1 Environmental impetus — The requirement of the complex and changeable Internet environments**

Under the networking environment based on the computer and Internet technologies, information exchange among different firms and different parts in a firm have transformed from face-to-face communication to virtual communication via Internet/Intranet. Especially, under the networking environment, the ability of interact by information has been enhanced greatly, information can be shared conveniently and fast among the customers, suppliers and competitors. All of these changes will bring about both challenges and opportunities for firm's total innovation management.

**4.2 The practice needs — The requirement of total innovation practice in firm**

Haier and Baosteel, as the leading companies in China have taken total innovation into practice, and keep a sustainable growth in spit of facing many multinational companies' competition. It is imperative that theorization of the practice of total innovation in leading Chinese enterprises which are unconscious to implement the TIM during the practice in innovation management. Because an effective theory from the firm's practice can be used to direct others better to carry out TIM. But traditional innovation management from the practice ago cannot provide a scientific and effective means for firm's innovation management in 21<sup>st</sup> century's new environment for its absence in the realization of the more and more turbulent environment, and complication of innovation management. So TIM are born naturally to satisfy the needs and wants of the practice and direct more Chinese firms to succeed in the future.

**4.3 Cultural foundation — agree with innovative culture**

Corporation culture in the paper pointed to shared beliefs and action rules posed gradually in the process of organizational development (Robbins, 1994; Aoki, 2001). Concretely, it encompasses value, philosophy of business, organizational target, action criterion, staffs thoughts, all of these to reflect an organizational spirit and regular everyone action directly or indirectly.

Total innovation in a firm not only pointed to the innovation of product or process, but also to the redesign of all staff action ideas and rules. To conduct TIM, the action of innovation management and thought mode must be adjusted. And a full culture for pursuing innovation is

of innovation management and thought mode must be adjusted. And a full culture for pursuing innovation is necessary. At the same time, in the process of total innovation, synergic innovation of different elements, co-operational innovation of every one in different functions will be sure to bring about new ideas and create new atmospheres for innovation contribute to the birth of innovative culture. So, TIM is seeded from innovative culture and its implementations give birth to the rich contents of culture for innovation.

## 5. MAIN CONTRIBUTIONS and EXTENSIONS

### 5.1 Main contributions of the new paradigm of TIM

(1) It offers a distinctive view on the core issues as well as new directions of innovation management field. First, the paradigm of TIM stresses the innovation synergy between technology element and non-technology one. Second, innovation synergy model shows how innovation element synergies between different organizational levels from a more integrated and dynamic overview of the field's main constructs and relationships. Finally, it urges people to better understand how innovation emerges and is enabled, and how innovation is actually integrated.

(2) It proposes an extension to the portfolio innovation management view and offers a more dynamic, integrative, and appropriate theoretical framework for the questions of interest to the innovation management field. This new paradigm combines the insights and coherence of the traditional innovation management view with the more relevant portfolio innovation management one, and mainly draws on three distinct areas of recent research, namely, the innovation theory of the firm, the resource-based view (RBV) and competence theory of the firm, and the complexity theory. It introduces the theoretical framework of TIM, and present the innovation synergy mechanism and pattern between technology element and non-technology one. Meanwhile, it takes time-space dimension of innovation management into account and holds the view that all people are innovators. The paradigm of TIM provides a basis for an upgraded, more unified, and better-attuned view on core issues innovation management field.

### 5.2 Policy implications and future research directions

Some theoretical and policy implications are as follows. (1) TIM is a journey to heighten competence of company, not a destination of company. It isn't an annual, quick fix, slogan-based strategy, but a long-term, competence-based strategy for achieving the sustainable competitive advantage involving all people at every level of organization. (2) TIM is about corporate survival and growth, therefore, it is ensured that top management is meaningfully involved for the successful TIM. (3) TIM is a long-term process of organizational learning. In conclusion, TIM is a very significant path to reinvent and revitalize the company competing at the 21st century.

Prompted by the limitations of this paper, future research directions mainly include four aspects: (1) the strategy of TIM, and its formulation and implementation; (2) the critical successful factors of TIM; (3) dynamics of organizational learning and TIM; (4) the measurement and performance of TIM.

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