

# *Research on the Positive Influence of Innovation Catalytic Capacity of Equipment Manufacturing Enterprises in Liaoning Province*

**Kui He, Mengdan Wang\*, Shuaikang Wu, Ming Liu**

*School of Economics and Management, Liaoning University of Technology, Jinzhou, Liaoning,  
121001, China*

*\*corresponding author*

**Keywords:** Innovation catalytic ability, Leadership type, Enterprise staff, Internal and External environment, Innovation knowledge

**Abstract:** Catalytic innovation is the key stage of manufacturing innovation and development. Its main function is to use catalysis to catalyse the internal and external conditions of enterprises. According to the enterprise innovation catalytic ability, this study studies the positive impact of enterprise leadership, internal and external environment, enterprise employees, enterprise innovation knowledge discovery ability and equipment manufacturing enterprise innovation catalytic ability. This study discusses the impact of the innovation catalytic ability of assembly manufacturing industry on the organization from a qualitative perspective, and puts forward corresponding suggestions to the government and enterprises.

## **1. Introduction**

In the digital transformation, enterprises need to speed up innovation to meet the demand of innovation in the new era, and innovation catalysation ability of equipment manufacturing enterprises is particularly important. However, at present, the innovation catalytic system of many enterprises is not very perfect, and the method of innovation catalytic and how to implement innovation catalytic are still in the fuzzy stage, which leads to the lack of motivation for enterprises to stop innovation and development due to the lack of willpower[1]. Nowadays our country's economy started a new phase, the network is closely connected with innovative catalytic relationship[2], can say is the enterprise to carry out the innovation of technology innovation network a primary means of catalysis, it has broken the conventional way of knowledge sharing between enterprises so as to accelerate the innovation of catalytic[3], but the direction of the technology innovation network catalysis is not so easy to grasp, It is also difficult to find the conditions for the realization of innovative catalysis[4]. Innovation catalysis helps organizations innovate by learning and creating behaviours that encourage each other to innovate through internal and external members or collaborators[5]. Wei Long et al. [6] believed that the difference and diversity of external knowledge, employees' willingness to share knowledge, and partners' need for knowledge guidance are the conditions for the formation of innovation catalysis. This paper

analyses the positive impact of enterprise innovation catalytic capacity from the aspects of organizational leadership, internal and external environment, organizational members and organizational technological innovation.

## **2. The influence of innovation catalytic capacity on enterprise leadership type in equipment manufacturing enterprises**

The type of leadership an organization chooses will affect the innovation catalysis of an enterprise to a certain extent. Autocratic leadership requires employees to perform tasks completely without paying attention to their expression and ideas. This type of leadership requires employees to obey and inhibits their creativity. Democratic leadership allows employees to participate in the decision-making process, put forward their own opinions and be adopted, which not only makes employees feel involved and satisfied, but also greatly inspires their creativity. Under this leadership, employees are also willing to share their knowledge and experience to encourage other members to innovate. There is also a kind of laissez faire leadership, leaving employees to make their own decisions. Although employees are given great freedom, their work efficiency is low due to the lack of human supervision. In reality, these three types of leadership rarely appear in a single leader. Leaders in an organization may combine two or three types of leadership styles, who are good at listening to employees' suggestions and recognizing their efforts. This kind of leadership is a combination of democratic and laissez-faire, which can be called inclusive leadership [7]. Like to communicate with employees, treat the relationship between themselves and employees equally, and work together with employees for the goal of the career to pursue a win-win situation is the platform leader [8]. Conversely, innovation catalysis will also have an impact on the selection of leadership types in the organization. Enterprises that need innovation catalysis will seek leaders who are good at organizing and managing employees to complete the task of innovation catalysis.

### **2.1. Inclusive leadership**

When leaders hope that the enterprise can catalyse innovation, employees will feel two kinds of signals from leaders: one is that leaders want to have the role of innovation catalyser in the organization; the other is that leaders support and trust this role and employees. When employees feel the first signal, they tend to think that they are the ones with innovative catalytic ability needed by leaders, and accept and carry out a series of innovative catalytic activities under their own imperceptible influence. When employees feel a second signal to let employees think they be trusted when increasing the employees' personalities, to reduce the risk of uncertainty, so when employees know leadership requires innovation catalytic talent, with the support of leadership, to maintain their positive image spontaneous learning so as to promote enterprise innovation catalysis [9]. Employees way of doing things will be affected by their leader, corporate organizational innovation the catalytic activities of the group have inclusive leadership participation, the staff will have more confidence to complete the task, this type of leadership is good at inspiring employees, also can accept the work of staff listen to their views, allowing employees in uncertain circumstances to try new methods [10]. And led by the guidance of the leadership of the inclusive among employees, between employees and leaders, employees and enterprises, between enterprise and the leadership of the trust will be improved, in this environment of mutual trust of the employees in mentality can change, have a stronger sense of responsibility of the enterprise more serious working attitude, are easier to implement enterprise innovation catalysis [11]. Therefore, enterprises tend to choose inclusive leadership in order to improve the catalytic capacity of innovation, thus improving the overall management level of enterprises and the benefits of innovation catalytic.

## **2.2. Platform leadership**

The influence of platform leadership on employees is more far-reaching, and employees are easily affected by the charisma of such leaders. Therefore, when leaders tend to develop innovative activities, employees are more likely to be motivated to participate in innovation and actively participate in innovation catalysis. Li Ling et al. [12] found that platform-based leadership has a significant positive effect on team learning emergence, creative self-efficacy and active innovation behaviour. Conditions for employees to carry out innovation catalysis include but are not limited to knowledge learning and absorption, employees' perception of their innovation catalytic ability, and their active participation in innovation catalytic performance. Therefore, enterprises tend to choose platform leadership in order to improve the catalytic capacity of innovation, thus improving the knowledge level of employees.

## **3. The influence of equipment manufacturing enterprise innovation catalytic capacity on enterprise employees**

The process of innovation catalysis cannot be separated from the leadership of human beings. It is a kind of subjective activity, and the members of the organization are the main body of innovation catalysis. Enterprise strength of professional knowledge, cultivate employees' sense of responsibility to the enterprise, enterprise innovation catalytic atmosphere all the employees of catalytic have a positive impact, this is a two-way promote the process of organization innovation in catalytic atmosphere thicker or organizational innovation task is very heavy when they make strong professional knowledge of staff consciously added to the innovation in catalysis. Highly professional employees will naturally engage in innovative behaviours or guide other employees to catalyse innovation when their professional knowledge accumulates to a certain extent [13]. Under the call of the leader, employees with corporate responsibility will also actively participate in innovation catalysis. Driven by the sense of responsibility, they share their own information to accelerate the innovation of team members and assist them to complete innovative activities [14]. Employees with strong innovation are more likely to drive others to innovate, which is equivalent to catfish effect. Enterprises have formulated management systems and incentive systems related to innovation catalysis to motivate employees. By contrast, employees with strong innovation are more likely to complete tasks and stimulate other employees to innovate [15]. Therefore, the innovation catalytic ability of enterprises makes employees more professional, more responsible and more innovative.

## **4. The influence of equipment manufacturing enterprises' innovation catalytic capacity on internal and external environment**

The innovation catalytic capacity of enterprises will affect the government's attitude towards innovation, the innovation policies issued by the government, the intensity of innovation competition among enterprises, the attitude of enterprises towards innovation, the implementation degree of enterprise innovation system and so on.

### **4.1. Government advocacy and policy**

With the development of The Times, innovation has been paid more and more attention by the government. All walks of life require innovation in order to survive and develop. The government's constant emphasis on innovation makes enterprises face up to it .When most of the enterprises to develop innovative catalytic ability to a certain extent, enterprise innovation is an important support

of catalytic including the government, the government can provide enterprises with legal first, related system, organization, supervision departments to help build a legitimate catalytic system, system innovation, make the government support innovation catalytic encourage innovation environment; Secondly, enterprises should be given direct or indirect help in carrying out innovation catalytic activities. Secondly, the government can provide direct or indirect support for enterprises' innovation activities .The government can directly invest in the innovation catalytic activities of enterprises to encourage enterprises to carry out innovation catalytic activities in the form of government subsidies or fund projects; It can also indirectly promote the innovation and catalytic development of enterprises through the method of exempting and reducing related taxes of enterprises and combining with the market [16].On the innovation of the government's main job is to bring to enterprise culture good catalytic atmosphere of innovation and innovation atmosphere, the innovation of the enterprise catalytic results inevitably impact with the outside world, the government to stifle innovation catalytic cost is higher than the benefits of it caused enterprises are not willing to innovate catalytic, will take the corresponding measures and policy support to promote enterprise innovation catalysis [17].Therefore, the improvement of enterprises' innovation catalytic capacity will bring positive attitude and supportive policies from the government.

#### **4.2. Inter-firm competition**

The competition between enterprises cannot be avoided, and one of the ways to gain advantages in the competition is to carry out innovation, that is, to develop new products, technologies or management methods. Innovation is a process that persists for a long time. In order to shorten the innovation time, necessary innovation catalysis should be carried out. Innovation catalysis can maintain and accelerate enterprise innovation. It can not only make enterprises have breakthrough development in innovation, change the development speed and competition pattern of enterprises, but also greatly shorten the innovation cost of enterprises to stand out in the innovation competition of various enterprises [18].The benign competition among enterprises will promote the innovation catalytic capacity of enterprises, and the innovation catalytic capacity of enterprises will increase in order to take advantage of the competition and break through the challenges brought by competitors' innovation .Compared with the stable internal environment, the external environment of enterprises fluctuates greatly. When the fluctuation exceeds expectations, the competition among enterprises intensifies. In order to survive and develop in the fluctuation and prevent competitors from catching up, enterprises will take corresponding measures to improve the catalytic capacity of innovation and accelerate enterprise innovation [19]. Opportunities are often hidden in crises. Fierce competition will drive innovation catalysis of enterprises, guide the direction of innovation catalysis, promote enterprises to explore and harvest external environmental information, enhance the cohesion of employees and internal knowledge sharing, and lay a solid foundation for enterprise innovation catalysis. Therefore, the innovation catalytic ability of enterprises will seek development and victory for enterprises in the competition and enhance the competitiveness of enterprises.

#### **4.3. The internal environment**

Affected by external environment and its own development on innovation to living project to make corresponding decision, degree of attention to the innovation of enterprises, enterprises create new scientific research personnel quantity, for the construction of an innovative catalytic project investment, enterprise innovation catalytic atmosphere, the innovation of the enterprises to establish management system and so on all affect its own innovative catalytic ability .The more enterprises attach importance to innovation, the more employees can participate in innovation catalysis, improve the quality of researchers to provide knowledge support for the process of innovation

catalysis, and appropriate management system and incentive system can motivate employees to actively participate in innovation catalysis [20]. Therefore, enterprise innovation catalysis will drive enterprise innovation atmosphere, improve enterprise management, improve enterprise internal environment.

## **5. Influence of knowledge on innovation catalytic capacity of equipment manufacturing enterprises**

Innovative knowledge is a key content of innovation in equipment manufacturing enterprises. The change of the exchange mode between old and new knowledge is conducive to promoting enterprise innovation catalysis [21], and the enterprise's ability to integrate knowledge will also affect innovation catalysis. The knowledge integration ability of equipment manufacturing enterprises promotes enterprises to study the occurrence of present and future innovation catalysis from the perspective of the past, and helps enterprises to safely survive the period of excessive innovation. The innovation knowledge integration ability promotes the efficiency of enterprise innovation catalysis [22]. The intellectual property protection of innovation results can also promote enterprise innovation catalysis, which is different from the policy of science and technology reward. Innovation benefits of innovators are enjoyed by themselves, which to a large extent motivates enterprises to carry out innovation catalysis [23]. Therefore, the firm's innovation catalytic ability will increase the firm's knowledge integration ability, strengthen the protection of intellectual property rights and innovation benefits.

## **6. Conclusions**

Through the analysis of the types of organizational leadership, internal and external environment of the enterprise, employees and innovation knowledge of the enterprise, the positive effects of the innovation catalytic capacity of equipment manufacturing enterprises are summarized as follows:

(1) In order to improve the catalytic capacity of innovation, organizations will choose inclusive leaders and platform-based leaders, which are more likely to lead employees to innovate and obtain innovation benefits and results. Therefore, more inclusive leaders and platform-based leaders are added to promote enterprise innovation.

(2) The improvement of the catalytic capacity of enterprise innovation will affect the change of the environment, will promote the positive attitude and policy of the government of the external environment on innovation, benign competition between enterprises, improve the quality of researchers in the internal environment, improve the appropriate management system, so it has a positive impact on the internal and external environment.

(3) The catalytic capacity of enterprise innovation will increase the ability of enterprises to integrate knowledge and stimulate enterprises to actively implement the protection of intellectual property, so it has a positive impact on the knowledge integration and property protection of enterprises. Due to the limited information available, many influencing factors may not have been included and need to be added later.

## **Acknowledgements**

This work is supported by Social Science Planning Fund Project of Liaoning Province (L21AGL012).

## References

- [1] Hu, S.J., and Zhuang, Y. (2018) *How to Stimulate the Catalytic Effect of Collaborative Innovation -- A Case Study Based on New R&D Organizations*. *Finance and Accounting Monthly*, 22, 111-116.
- [2] Tatarynowicz, A., Sytch, M., and Gulati, R. (2016) *Environmental Demands and the Emergence of Social Structure: Technological Dynamism and Interorganizational Network forms*. *Administrative Science Quarterly*, 61(1), 52-86.
- [3] Tortoriello, M., McEvily, B., and Krackhardt, D. (2015) *Being a Catalyst of Innovation: The Role of Knowledge Diversity and Network Closure*. *Organization Science*, 26(2), 423-438.
- [4] Wei, L., Dang, X.H., and Yan, H. (2021) *Technological Innovation Network Routines Replication Mechanism and Impact on the Catalyst of Innovation: A Theoretical Framework Based on Paradox Integration*. *Nankai Business Review*, 1-13
- [5] Martin, R.L. (2011) *The Innovation Catalysts*. *Harvard Business Review*, 89(6), 82-87.
- [6] Wei, L., and Dang, X.H. (2018) *Routines Replication, Network Closure and the Catalyst of Innovation: An Interaction Model*. *Nankai Business Review*, 21(3), 165-175+190.
- [7] Nembhard, I.M., and Edmondson, A.C. (2006) *Making it Safe: The Effects of Leader Inclusiveness and Professional Status on Psychological Safety and Improvement Efforts in Health Care Teams*. *Journal of Organizational Behavior: The International Journal of Industrial, Occupational and Organizational Psychology and Behavior*, 27(7), 941-966.
- [8] Hao, X.G., Zhang, J.Q., Lei, Z.Q., and Liu, W.Q. (2021) *Platform Leadership: The Multi-dimensional Construction, Measurement and Verification the Impact on Innovation Behavior*. *Management World*, 37(1), 186-199+216+12.
- [9] Liu, Z.Q., Yan, R.X., and Tang, S.S. (2021) *Leader Innovation Expectations and Employee's Breakthrough Innovation Engagement: A Study Based on Paradox Theory*. *Management World*, 37(10), 226-241.
- [10] He, K. (2021) *Research on the Influence Mechanism of Inclusive Leadership on Employees Innovative Proactive Behavior: the Moderated dual Mediating Role*. *Science & Technology Progress and Policy*, 38(21), 126-132.
- [11] Tang, R. (2021) *Research on the Influence Mechanism of Inclusive Leadership on Employees' Innovative Behavior -- Taking Organizational Trust and Psychological Security as Chain Mediating*. *Management and Administration*, 9, 131-138.
- [12] Li, L., Tao, H.Y., and Song, H. (2022) *Multilevel Influence of Platform Leadership on Employee Proactive Innovative Behavior*. *Science & Technology Progress and Policy*, 1-9.
- [13] Tang, S.Y. (2017) *Influence of R & D Personnel's Personal Ability and Team Member Exchange Matching on Innovation Performance*. Harbin Institute of Technology.
- [14] Zhou, N.H., Yu, M.Y., and Xin, J. (2021) *Perceived Corporate Social Responsibility and Employee Creativity*. *R&D Management*, 33(6), 111-123.
- [15] Wang, B.L. (2021) *Organizational Innovation Support and Employee Innovation Behavior*. *Seeker*, 4, 187-195.
- [16] Lan, J.X. (2020) *Influence of Government Policy Support on Technological Innovation Capability of Enterprises*. Shanghai University of Finance and Economics.
- [17] Feng, F.P. (2019) *The Influence of Government Industrial Policy on Enterprise Innovation--Literature Review and Logical Framework*. *Journal of University of South China (Social Science Edition)*, 20(6), 69-77.
- [18] Kaplan, S., and Vakili, K. (2015) *The Double-edged Sword of Recombination in Breakthrough Innovation*. *Strategic Management Journal*, 36(10), 1435-1457.
- [19] Peng, C., Xi, L., and Zhang, X.W. (2018) *Breakthrough Innovation to the Enterprise Continuous Competitive Advantage on High Turbulence and Competitive Environment*. *Science and Technology Management Research*, 38(24), 10-17.
- [20] Yayavaram, S., and Chen, W.R. (2015) *Changes in Firm Knowledge Couplings and Firm Innovation Performance: The Moderating Role of Technological Complexity*. *Strategic Management Journal*, 36(3), 377-396.
- [21] Chen, J., Zeng, D.M., and Ou Yang, X.P. (2021) *The Impact of Knowledge Integration Capability on the Performance of Manufacturing Firms Based on Exploratory Innovation*. *Journal of Systems & Management*, 30(4), 631-642.
- [22] Cheng, Y., Yang, L., and Shan, L.Q. (2020) *Research on Innovation Ability of Pharmaceutical Manufacturing Industry in Jiangsu Province*. *Modern Business Trade Industry*, 41(31), 1-3.