

Education and Management of Researchers in the Disruptive Technology Industry

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ABSTRACT

This study aims to start with the connotative characteristics of disruptive technology and use the knowledge of pedagogy and psychology to analyze and solve the personal problems and obstacles of disruptive technology researchers. By using of literature review, timeline and relevant data to clarify the development trend of disruptive technology and its impact on researchers. Therefore, in the concept of education and management of R&D personnel, we shall follow targeted principles to ensure the innovative development of disruptive technologies and provide firm support for the development of related industries and national strategic technologies.

Keywords: *Disruptive technology; R&D personnel; Principle; Guidance*

1. INTRODUCTION

This study aims to start with the connotative characteristics of disruptive technology and use the knowledge of pedagogy and psychology to analyze and solve the personal problems and obstacles of disruptive technology researchers. By using of literature review, timeline and relevant data to clarify the development trend of disruptive technology and its impact on researchers. Therefore, in the concept of education and management of R&D personnel, we shall follow targeted principles to ensure the innovative development of disruptive technologies and provide firm support for the development of related industries and national strategic technologies. technologies very different from the technological development path of traditional technologies. Compared

with the gradual cultivation of traditional technologies, the early cultivation and development of disruptive technologies are subject to greater pressure and challenges. It is precise because of the destructive connotation of disruptive technology that disruptive technology does not gently and slowly transform the social and economic environment in which traditional mainstream technology is located[2]. It often results in a return to zero after entering mainstream application scenarios. Disruptive technology will have a clear effect on the technological ecology constructed by the traditional mainstream technology system. Therefore, in the process of cultivation and development, disruptive technology often conflicts with many mainstream technology application systems. It can be concluded by combining previous studies as the following characteristics.

Table 1. Summary of disruptive technology characteristics

	Relationship with incumbent technology	Own attributes
Early vulnerability	Vulnerable to technical impact	Its own development is unstable
Anomaly	Clear boundaries with the in-place technology	A unique technological development path
Coverage	Same demand group as in-place technology	Closely related to the actual needs of society
Creativity	In-place technology cannot meet certain needs	A second battlefield
Resistance	In-place technology to consolidate its position requires substantial innovation	Possess powerful unique functional advantages
Alternative	It takes a process to replace in-place technology	Need to maintain strong technological competitiveness
Strong transformability	Unlike In-place technology, it has a stronger impact on the industry	A strong transformative power

2. COMPARISON OF DISRUPTIVE TECHNOLOGY AND TRADITIONAL TECHNOLOGY

Disruptive technologies differ from other technologies and are often extremely destructive to traditional mainstream technologies[1]. Christensen, the proponent of disruptive technology, defines disruptive technology as a powerful alternative and destructive technology to traditional technologies. And this characteristic makes the technological development path of disruptive technologies. Disruptive technologies are often affected by the interests of enterprises, society, and the country, so its concept is also developing. The target effects of their technologies are dynamically adjusted, so they are full of uncertainty. But what is certain is that the huge transformative energy contained in disruptive technology is recognized by all walks of life, and people from all walks of life, such as the military, scientific research institutions, and think tanks, have put forward the interpretation and connotation of disruptive technologies[3].

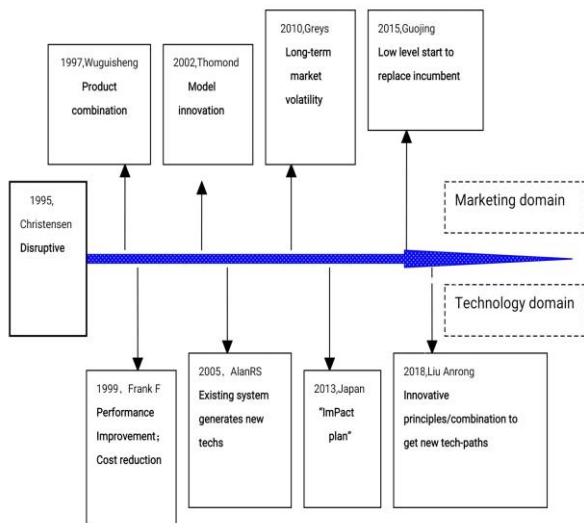


Figure 1. Conceptual-word development of disruptive technology

3. THE RIGHT CHOICE FOR GUIDING DISRUPTIVE TECHNOLOGY R&D PERSONNEL

At present, many countries in the world have carried out policy formulation and R&D institutions at the national strategic level in response to the huge potential of disruptive technologies. Except for the famous US DARPA (Defense Advanced Research Projects Agency), Japan has been doing it since 1971. Start to predict the direction of disruptive technology and implement ImPACT (Disruptive Technology Innovation Program) with the support of the Cabinet Office of Japan and the Japan Science and Technology Promotion Agency (JST). The United

Kingdom also released the third round of technology foresight and innovative future project forecast reports in 2010. Russia has also established an advanced fund research group to carry out cutting-edge research on disruptive technologies. The investment in science and technology of major countries has been dramatically rising, which demonstrates the significance of the relevant study.

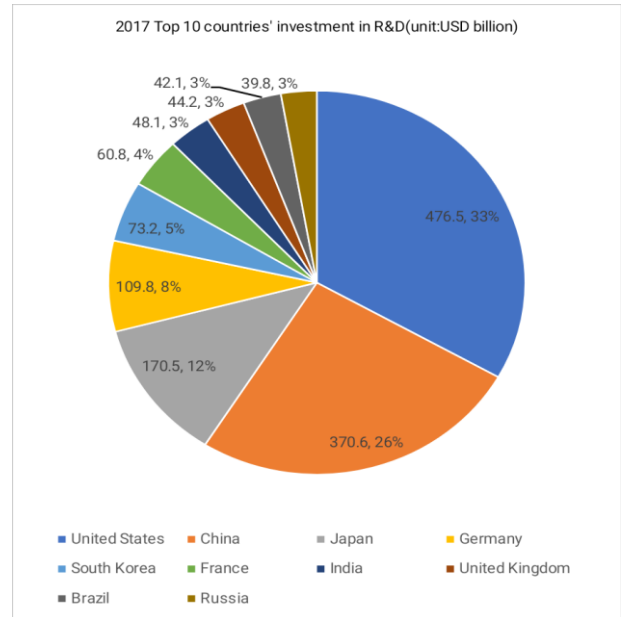


Figure 2. 2017 National investment in R&D

Taking the above Fig.2 as an example, the United States' scientific research investment can be said to be the highest in the world, reaching 476.5 billion US dollars. Such scientific research investment is also a testament to the United States' long-term technological leadership. It can be foreseen that, shortly, the research on disruptive technologies in various countries in the world will gradually move towards professional and organized research supported by national strategies. As the basis for research organizations, the significance of scientific researchers is of vital importance. Disruptive technology researchers are currently often subject to poor evaluation systems and endure too heavy scientific research pressure and psychological burden. However, the traditional scientific research system often emphasizes the transformation efficiency of scientific research results too much, lacks the overall consideration of scientific research projects, and neglects the humanized care of scientific research personnel in the scientific research process, thus laying down hidden dangers such as the withdrawal of scientific research personnel due to personal problems. Therefore, it is necessary to initially explore the psychological level of education and communication for researchers under disruptive technology, and provide references for the construction of a good scientific research atmosphere for researchers.

4. PRINCIPLES FOR GUIDING PERSONNEL RELATED TO DISRUPTIVE TECHNOLOGIES

To coordinate the work of relevant scientific researchers in the process of disruptive technological innovation and development is indispensable to guide and cultivate all aspects of their thinking and awareness. In this context, certain principles need to be established to educate and guide scientific researchers and provide them with scientific principles[4].

4.1. Disciplines should be interconnected

Due to the inseparable relationship between basic science and applied technology today, the disruptive innovation of a specific technology is still inseparable from the support of talents in related disciplines. For example, ultra-high-speed manned aircraft need certain physiological support to ensure the safety of personnel. This requires that before carrying out technological innovation, find out certain cross-knowledge from different fields and conduct popular education for all participants, to avoid the disciplinary barrier of later communication and promote the efficiency and effect of technological development. Makes communication channels wider.

4.2. Research ought to be focused

Even though the types of disciplines involved in technical research are relatively complex, after having established goals, the development of research is focused. The proportions of investment in different technical modules are different, so it is necessary to clarify in advance which direction areas are needed to focus Investment, which direction areas play a supporting role, and different priority levels are determined so that the limited resources can be maximized and the unreasonable use and waste of R&D resources can be avoided. R&D decision-makers should grasp the focus of technology research and development, make selective and key investments, and adhere to the principle of optimal planning.

4.3. Research with a developmental perspective

Research on disruptive technologies often has dynamic prospects in many cases, limited by the overall national strategic background, changes in the international situation and even economic support. Compared with traditional technological innovation, disruptive innovation often does not have existing research. Data and models are used as a reference. Researchers should adopt a developmental perspective and make adaptive research adjustments and improvements based on changes in the situation, and then optimize research plans.

4.4. Research with an open mind

The research of disruptive technology must break the shackles of thinking behind closed doors. From upstream R&D decision-makers to downstream R&D operators, it is necessary to keep abreast of relevant international frontier dynamics, and reasonably borrow and learn from the experience that is conducive to their technological innovation. At the same time, project colleagues in different fields in the same project, should not cooperate with a guardian mind. They should focus on communication and sharing, rational competition, and make it clear that the ultimate common goal is the same. Under the same project, different types of R&D personnel can be cultivated for a win-win situation.

4.5. Objectively consider the ability of researchers

In disruptive innovation, due to some special factors, it is often interfered with from outside of scientific research. At this time, the leaders and decision-makers of R&D must respect the objective development laws and their resource conditions, and deal with interference rationally[5]. Giving full play to the subjective initiative of scientific researchers will certainly promote technological innovation, but it must be controlled within a reasonable range, the physical and mental endurance and conditions of the personnel must be considered, and no overly ambitious research and development goals and routes must be set. Leaders and decision-makers can learn from the thinking of the recent development area in pedagogy, that is, scientifically exert the creativity of scientific researchers, and allocate certain challenging scientific research tasks at their existing level: these tasks are more than conventional tasks. Highly difficult scientific research, but it is within the scientific research personnel's ability to complete[6]. This can not only stimulate the scientific research motivation of scientific researchers but also avoid the generation of unrealistic scientific research tasks, thereby saving scientific research resources and optimizing their utilization.

5. CONCLUSION

It is undeniable that when disruptive technology is just beginning to innovate, its early immaturity determines that it will inevitably fail. These are objectively existing. The key to scientific researchers is to correct the ups and downs encountered in the process[7]. Failure attribution analysis is whether it is caused by internal or external reasons. The internal reason is the level of ability, effort, or physical and mental state; the external is luck, the difficulty of the task, or other environmental factors. Self-professional cognition refers to the correct understanding and evaluation of oneself and the work. Everyone has their unique personality, thinking, temperament, interest and ability and

other psychological factors. They must have a correct understanding of these factors in the work process, maintain a positive and healthy attitude, and adopt the correct methods to eliminate and release them. Prevent mental fatigue. To advance innovative technologies such as disruptive technologies, the researchers need to do a lot of jobs. The production of new technology needs the support of internal and external environments and the development of relevant personnel in order to show its productivity[8]. Disruptive technology has relevant policy support and application conditions that are conducive to its development in the early stage of development. It is necessary to focus on the guidance and education of relevant personnel to remove psychological barriers and fundamentally ensure a relaxed environment for the development of disruptive technology, let it play an emerging technology function.

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