Small Development Projects for Developing Overall Understanding of Product Components

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Abstract: Video games require the integration of elements such as world building, scenario, graphics, and music (Ikuine, 2000). In a video game product development project, the personnel who design and coordinate each element need to have an overall understanding of the product components. In the Japanese video game industry of 20 or more years, new employees were able to participate in the design and coordination of each element of the product as soon as they joined the company and acquired an overall understanding of product components. However, due to the recent increase in the size of development projects, the tasks assigned to new employees have become more segmentalized and modular, resulting in it becoming difficult for them to acquire an overall understanding of product components. Cyber Connect2, a Japanese video game development company, is trying to solve this problem by launching small experimental video game development

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projects and assigning young employees to work on them.

Keywords: Japanese video game industry, product development, product integrity, human resource development

Introduction

Based on previous discussions, it can be pointed out that the advantages of having small-scale experimental projects are (1) promotion of radical innovation and (2) improvement of intrinsic motivation of employees.

(1) Benefits of promoting radical innovation

Ikuine (2012, 2021) points out that when companies try to improve their development productivity through continuous product development, they focus on using existing data and development know-how, which in turn makes it difficult to use radical innovation that adds new elements to the product. Ikuine calls this trade-off between the pursuit of development productivity and significant product innovation as the development productivity dilemma.

As a solution to the problem of emphasizing the use of existing knowledge and efficiency within a company, Tushman and O'Reilly (1997) espoused the ambidextrous organization, which involves two organizations—one to exploit existing knowledge and the other to explore new knowledge. Tushman and O'Reilly’s discussion was for business units. When translating this into a discussion of the units of product development projects, having small-scale, experimental product development projects along with large-scale, efficiency-oriented product development projects is an effective way to solve the development productivity dilemma pointed out by Ikuine (2012, 2021).
(2) Benefits of improving employee intrinsic motivation

Takahashi (2015) espouses the Work–Work Theory, which states that in the Japanese-style personnel system, “the reward for the work is new work.” Evaluating employees’ abilities and assigning them more challenging works can increase intrinsic motivation.

In addition, Takahashi (2014) and Takahashi, Ohkawa, and Inamizu (2014) pointed out that even if the current job is demanding, job satisfaction is maintained if there is a perspective that more rewarding new work will be given in the future.

The work given in small-scale, experimental product development projects is often challenging and exciting. Having this kind of work in the company and assigning it to employees as a reward improves intrinsic motivation and helps maintain job satisfaction.

In addition to (1) and (2) above, this paper uses the case of Cyber Connect2, one of the Japanese video game development companies (hereinafter referred to as “JVDCs”), and points out that small-scale experimental product development projects have a new significance as a place to foster development personnel’s overall understanding of product components.

Characteristics of Video Game Development

According to Ikuine (2000), if there is no integrity between elements such as world building, scenario, graphics, and music in video games, consumers will not be able to immerse themselves in the game play.\(^1\) Therefore, each element needs to be created without inconsistency and must have integrity in every detail.

Fujimoto and Yasumoto (2000) pointed out that video game

\(^1\) For example, soft music is played during tense scenes, and opponents who are considered tough in terms of the scenario can be defeated using simple operations.
development activities have much in common with development activities in the automobiles in the sense that they require integration among product elements. Focusing on the skills required of a leader in automobile product development, Clark and Fujimoto (1991) suggest that one of the skills a product manager should have is a broad, if not deep, knowledge of overall vehicle engineering. Similarly, in a product development project for a video game, the person who designs and coordinates each element needs to have an overall understanding of the product components, in addition to the elements he or she is responsible for, including how they interact with other elements.

Problems of Human Resource Development in JVDCs

Matsuyama, CEO of Cyber Connect2, one of the JVDCs, points out that the shift to larger-scale projects that have occurred over the past 20 years has caused problems in human resource development. Matsuyama’s points can be summarized as follows:

(a) In the development site of about 20 years ago, about 20 staff members were working together to develop products, and they were able to learn about the entire development process. This placed a heavy burden on the individual, but it also allowed them to grow as a result. However, development projects for current major video games involve a system of division of labor among hundreds of staff. The job description for new employees can be very fragmented. For example, it is like they are “just planting trees from the edge of the vast open world,” and it makes it difficult for them to feel that they are truly contributing to the video game development.

(b) About 20 years ago, the development period was about one year,
and people could gain experience in producing about 10 works in their 20s. However, the current development project period for major video games is long, at 3–5 years. Consequently, people can be involved in only three or so video games in their 20s, and this also deprives them of the diversity in production experience.

What Has Happened in the Gaming Industry in the Last 20 Years?

Matsuyama’s point is clear to those who are involved in video game development but may be unclear for those who are not familiar with video games and requires some explanation. To help the general reader understand, we will divide the discussion into (1) video game development of 20 years ago and (2) video game development of today and explain in detail why it has become difficult for developers to gain an overall understanding of product components.

(1) Video game development 20 years ago

If it was a development project about 20 years ago with about 20 individuals, as Matsuyama mentioned above, even a newcomer could—or rather, had to—participate in the verification and review process.

By participating in this process, developers will be able to see the whole picture of what kind of video game they are making and understand what role the elements they are responsible for play in making the game enjoyable. They are able to devise their work by considering the relationship with other elements, as well as propose new specifications for the overall product and influence the degree of perfection of the product. This kind of experience will lead to the acquisition of an overall understanding of product components. For example, Hirasawa (2000) describes the development team of Nintendo’s *Super Mario Brothers*. In the development of this software, Tezuka, a new employee who had just graduated from college, had
been participating in a meeting where Miyamoto, the development leader; Nakagou, the programmer; and other developers discussed and coordinated the specifications of the video game. Tezuka had no knowledge of video games before joining the company, but he learned by watching the process of various developers exchanging opinions. As a result, he was able to come up with ideas for stage design that matched the world building of *Super Mario Brothers*, and he was able to propose specifications that were consistent with other elements based on the game’s concept. Subsequently, he became the director.3

Additionally, more than 20 years ago, development projects were completed in a short period of time, and developers were assigned to new projects consecutively. By participating in the development of video games of various genres and working under different leaders with different personalities, they were able to experience the connection between various game elements and achieve personal growth.

Ikuine (2003) conducted an interview survey of major JVDCs and pointed out that 9 of the 12 companies, in their hiring policy, (a) hired mainly new graduates and trained them through on-the-job training, (b) did not emphasize performance-based compensation linked to the sales of the developed software, and (c) many companies were interested in retaining core personnel. These characteristics are consistent with the so-called Japanese-style personnel system.4

About 20 years ago, around the year 2000, when Ikuine (2003)

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3 After graduating from art college, Tezuka was hired as a graphic designer, where he was in charge of drawing terrain, etc. Starting with *Super Mario Bros.* 3, Tezuka took on the role of director in the real sense. https://www.nintendo.co.jp/nom/0004/01/page06.html

4 In the interview survey conducted by Ikuine (2003), one company clearly stated that its personnel system is a “Japanese-style personnel system with long-term employment.”
conducted his survey, JVDCs were considered to be able to foster new employees to naturally develop an overall understanding of product components by having them involved in the development process and to secure the human resources to lead the development of video games through the Japanese-style personnel system.

(2) Video game development these days

In 2000, the PlayStation 2 was released with advanced rendering capabilities and support for online connectivity. Since then, the scale of video game development projects has grown dramatically in accordance with the increasing performance of hardware. As a result, major video games development projects in recent years have involved hundreds of staff members.

In a team of several hundred people, it would be difficult to get everyone to agree on the specifications of the video game, so it is necessary to divide the work between the design and coordination of the specification and produce the game according to the specifications. Firstly, core personnel such as producers, directors, lead programmers, concept artists, etc. design and coordinate the specification, which is then divided into modules and distributed to teams. Many employees, including younger employees, are in charge of developing the respective modules as instructed.

In addition, the increase in 3D graphics resolution, the expansion of maps, and the complexity of character motions and behavioral algorithms have increased the man-hours required and reduced the scope of what one developer can handle. For example, a graphic developer may be able to work only on a particular fragment of a video game, such as drawing a part of a building on a map.

As mentioned earlier, many JVDCs have adopted a Japanese-style personnel system for developing overall understanding of product components.

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The study by Ikuine (2003) is based on interviews conducted between July 1998 and August 2000.
personnel system, designed to train younger employees by giving them simple tasks and then assigning them more difficult tasks as they develop. However, the rudimentary tasks given to young employees are fragmented in the manner instructed. Further, the prolonged development process has reduced the number of projects that young people can be involved in. This means that the experience of learning about the relationship between the various elements of the video game, thinking of new elements by themselves, and exchanging opinions with others is lost, making it difficult to acquire an overall understanding of product components. Consequently, it has been difficult to develop human resources who can lead the development of next generation video games.

(3) Summary of current issues

To summarize the above problems facing human resource development in the current JVDCs, the Japanese-style personnel system, which worked effectively in small development organizations

![Figure 1. Differences in work given to new employees 20 years ago and today](image-url)
and was based on the assumption that new employees would develop as they undertook on new tasks, has been maintained despite changes in the nature of the tasks assigned to new employees (Figure 1).

**Measures at Cyber Connect2**

Matsuyama in Cyber Connect2 is trying to solve the problem of human resource development by starting up three small-scale, experimental, indies-type development projects and placing younger employees in charge of them. The number of people in these projects was around 20 each, which reproduced the small-scale development organizations of around the year 2000, when the Japanese-style personnel system was functioning.

However, if the scale of development is reduced, and only experimental works are produced simply for the purpose of making

![Diagram of human resource development using small development projects](Image)

**Figure 2.** Human resource development using a small development projects

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6 [https://www.famitsu.com/news/201903/25173291.html](https://www.famitsu.com/news/201903/25173291.html)
the Japanese-style personnel system work, the company’s management will not be stable. For a company to operate stably, it is also essential to also have large-scale development projects that have accumulated development know-how.

By owning a large-scale development project and a small-scale development project simultaneously and transferring human resources between them, as shown in Figure 2, it is possible to have young employees (1) participate in the large-scale development project to acquire basic knowledge, to (2) select young employees with ability and have them participate in the small-scale development project to acquire an overall understanding of product components, and (3) use the trained employees as core human resources in the large-scale development project.

**Discussion**

Shintaku and Ikuine (2001) and Shintaku (2003) point out that in the U.S., video game development companies hire mid-career human resources who can be immediately effective, rather than rely on in-house training. This suggests that in the video game industry, a Japanese-style personnel system, in which young employees accumulate work experience and training, is not essential.

So, why did Cyber Connect2 choose to maintain the Japanese-style personnel system by creating new, smaller projects? The reason may be due to the following factors.

**(1) Lack of external labor market**

Zagal (2013) studied the training of video games developers in Japan and pointed out that in Europe and the United States, specialized human resources are trained at universities and other institutions of higher learning, whereas in Japan, education is mainly provided at vocational schools.
In Japan, the Japanese-style personnel system is maintained because companies have to rely on the internal labor market to secure highly skilled video game developers. However, there is no requirement that the JVDC has to use Japanese employees. Many of the JVDCs have development bases overseas as well. As long as they do not insist on hiring in Japan and instead gain talent immediately from the overseas labor markets, they will not be affected by problems in the Japanese labor market. A separate reason would be required for JVDCs to insist on hiring personnel in Japan and training them through a Japanese-style personnel system.

(2) Rigidity of strategy to use tacit knowledge

Ikuine (2003) points out that the reason why many JVDCs have adopted a Japanese-style personnel system is because of their emphasis on tacit knowledge as well as explicit knowledge in video game development.

Meanwhile, Shintaku and Ikuine (2001) pointed out that in the U.S. video game development companies, video game development know-how is in the process of being converted into explicit knowledge. Therefore, it cannot be said that the Japanese-style personnel system is necessary because tacit knowledge is required for video game development. The problem in JVDCs can be replaced by that of not changing the development strategy to emphasize tacit knowledge when it can be changed.

The reason a shift in development strategy is not possible can be explained by the core rigidity of Leonard-Barton (1992). In the growth and development stage of JVDCs, the tacit knowledge accumulated by employees has become its core competence, and the fact that the Japanese-style personnel system has brought success to the human resource strategy of accumulating and using the company’s unique tacit knowledge is thought to make it difficult to change the personnel
system. Thus, Cyber Connect2 has started up small product development projects and is trying to make the fostering of development human resource function again with a Japanese-style personnel system.

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