

# INVESTIGATION INTO GEOGRAPHICAL SUPERIORITY FOR CARRYING OUT GAME DEVELOPMENT - A COMPARISON BETWEEN THE US AND JAPAN -

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## ABSTRACT

Bases for game development in Japan and the US are integrating. In Japan, Although Tokyo is the center of game development, there are other bases. As for the US, game development is focused in California. Integration of development bases in Japan and the US cannot be compared using the same criteria, however, the game industry in the US has congregated in California which suggests that it has some geographical superiority. In Japan, many industries are in Tokyo, thus, we speculate that the game industry is too. Here we discuss how geographical superiority in countries like the US affect game development. The research question is 'What effect has the integration of game development had on the development system?' Research was carried out by interviewing 15 key personnel in both the game development and management. In the US, where human resource mobility is high, the growth of the entertainment industry is noteworthy. Especially the booming of game development in Los Angeles, and the Silicon Valley. Whereas, in Seattle, despite being the home to Nintendo of America and Microsoft, the industry is not growing. No other city has seen integration like that in California. In Canada, measures to boost the industry have seen growth particularly in British Columbia and Toronto. The results find that in the US CG technology from the film industry can

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be applied and developed for the US game industry. Employees in the film industry realized the attraction of the interactive elements of games, which movies lack, and this is paramount to procuring development capital and partner research universities. The movement of human resources from the film industry influenced both the development and management of the game industry. In Japan, it is yet to be seen that there are any influence from geographical superiority.

*Keywords: geographical superiority, cluster, Standardization, tacit knowledge, explicit knowledge*

## **1. INTRODUCTION**

While there are many ways that industries can be categorized, one way to do so is to divide industries into those with vertical integration and those with horizontal specialization.

Currently in Japan, a prototypical example of a vertically integrated industry that has long succeeded in the global market is the automobile industry. Japanese automobiles have gained popularity in many markets, chiefly in the US and Europe. The subcontracts and the systemization of the automobile industry falls into a vertical structure, with the parent company responsible for the final product at the top and primary and secondary subcontractors falling below it (Harada, 2009). This has allowed the parent company to establish a competitive advantage in all aspects, including technical expertise and information. This, they argue, is the result of companies striving for greater productivity by shifting from specialization within the company to specialization across companies. One difference between the Japanese automobile industry when compared to many home appliances is that they have not moved manufacturing to developing countries for the lower wages, and have instead focused on moving manufacturing to countries which hold large markets. In other words, they manufacture in locations close to the markets.

In contrast, an example of a horizontally specialized industry is the gaming industry. Starting with the release of the Nintendo Entertainment System (NES) in the US, Japan, and Europe, this industry evolved from 1983 to 1986 as a horizontally specialized industry.

In this research, we will examine the gaming industry as an example of a horizontally specialized industry with its developmental origin in Japan, and comparing it with vertically integrated industries. By doing so, this will make clear what leads to a successful horizontally specialized industry. One characteristic of gaming devices is that there is a complete separation between the hardware, whether it be a gaming console or a handheld device, and the software. This separation can be said to have led to the increase in the number of games available, as well as improvements in the qualities of those games.

Game developments in Japan is typically done on a per-project basis, planned around hardware updates, with the development divided into planning, programming, graphics, and

sound divisions. The mobility of workers in Japan is generally quite low, but in the entertainment industry, which the game industry is emblematic of, it is common for people to move from company to company due to a number of factors. Firstly, the research and development departments of service sector companies in Japan are highly concentrated in Tokyo. Secondly is that within the gaming industry itself, there are a number of industries, such as the tech industry and the animation industry, where many of the same technologies are used, so there is a smooth interaction between people working in these industries. Also, in the game industry, it is quite easy for workers to switch jobs after the completion of a game (Hanzawa, 2005). Actually, when workers switch jobs, it is common practice to have them sign non-disclosure agreements (NDAs), but it is difficult to enforce them. However, it can be said that this high mobility of talented people has led to the development of the gaming industry as a horizontally specialized industry.

In the United States, the mobility of talented people has been examined from a number of different angles. In Silicon Valley and on the west coast of California, especially in the tech industry, a high mobility of talented people can be observed.

Previous research examining the game industry from the perspective of geographical superiority exists, focusing on the Japanese market alone (Hanzawa, 2005). However, this study was conducted when the dominant hardware was the PlayStation 2, two generations prior to the current generation. Since then, software development environments have changed drastically. With the spread of network games and the advent of Indy games, modern game consoles have evolved significantly, but there are a few studies which have examined the current development systems of the US and Japanese companies from the perspective of geographical superiority. In addition, Porter (2000) discusses and defines the industry clustering in the Japanese game market from a cluster stand point. However, there are very little additional researches that touch upon development systems from a cluster or geographical superiority view point.

This research examines how software development systems have evolved from the perspective of geographical superiority. The study started with the release of the PlayStation 3, released in November 2006 in the US and Japan, and in March 2007 in Europe, popularizing 3D and CG technologies and leading to the mainstream adoption of game downloads, and continues to the PlayStation 4, the most popular game console in the global market today.

## **2. REVIEW OF PREVIOUS RESEARCH**

The game industry, R&D, management, and agile development have been researched from the perspective of various fields. Ogawa (2011) examined the transition from NES to PS2 and Nintendo's Wii, while Okamoto (2011) investigated the same subject from the viewpoint of the hardware and software. Meanwhile, Cornelia et al. researched the mobility and innovation of

human resources. Tanaka (2005) researched innovation and industrial organization. Ikuine focused on development productivity (2012), and Shintaku et al. focused on the gaming industry from an economic point of view. Lee et al. (2006) studied the role of the producer in a broader sense. Masuda et al. (2016) researched the mobility of human resources from the film production industry as the key to success of the United States' game manufacturers.

### 3. RESEARCH QUESTION

What effect has the integration of game development had on the development system?

### 4. METHOD AND INTERVIEWEES

The interviews were conducted with primal publishers and consultants in both the US and Japan, by the method of semi-structured interview. A list of the interviewees is shown in Table 1. The questions asked during these interviews were, "What are the reasons for the increased integration among developers in the game industry?" and "How can this increased integration be taken advantage of?".

Table 1: The interviewees' lists of the month/year, category, department, title and place from March 2015 to August 2016

Month/Year	Category	Department	Title	Place
May/2015	Publisher in Japan	Overseas license	Manager	Japan
June/2015	Publisher in the US	-	Board member	U.S.
June/2015	Publisher in the US	Overseas license	Vice president	U.S.
June/2015	Publisher in the US	Development department	Senior producer	U.S.
July/2015	Publisher in the US	Overseas license	Marketing Manager	Japan
July/2015	Global publisher	Overseas license	Vice president	Japan
August/2015	Publisher in the US	-	Board member	U.S.
August/2015	Publisher in the US	Development department	Senior producer	U.S.
August/2015	Game's consultant in the US	-	CEO	U.S.
August/2015	Publisher in the US	Development department	Producer	U.S.
December/2015	Publisher in Japan	Foreign affairs department	Vice president	Japan
December/2015	Global game's consultant	-	CEO	Japan
March/2016	Publisher in Japan	Foreign affairs department	Manager	Japan
March/2016	Global publisher	-	Board member	Japan
August/2016	Publisher in the US	Development department	Senior producer	U.S.

## 5. INTERVIEW RESULTS AND ANALYSIS

In this research, we asked foregoing questions to 15 interviewees, and obtained results offering a comparison between the United States and Japan. Although there are differences in position among engineers/arts, managers, and executives, we extracted the interview results that were common to all of them, compared our results to previous studies and research the authors had conducted, and finally analyzed them.

In Japan, increased concentration in the capital city of Tokyo has progressed in many different industries, and this has been especially prevalent among research and development departments. A noteworthy exception is only to Nintendo in the game industry, as it has experienced the successful integration of both hardware and software development. Some accumulation is seen outside of Tokyo such as in Osaka and Fukuoka. A previous paper has examined the integration i.e. cluster in Fukuoka (Wada, Ichikohji, Hanzawa, Ikuina, & Cho, 2012). There are different types of clusters such as: "naturally occurring themselves", "materials produced and commodification", "Produced by policy guidance" and so on. (Harada, 2009).

Many industries have become increasingly concentrated in Tokyo, and at the same time higher education institutions such as universities are too heavily concentrated in Tokyo. Game-related education and research is no exception. Therefore, it is only natural that young people who are hoping to work in the gaming industry in the future look for work in Tokyo, where the development departments are. This is how the Tokyo game industry cluster has been formed.

In the gaming industry in Tokyo, we could not clearly confirm the existence of clusters, but as innovative industries become increasingly integrated in Tokyo, entertainment industries of every sort, advertising agencies, and freelancers are also increasingly becoming clustered in Tokyo. One characteristic of the Japanese gaming industry is that specifications—the development details—are vague when compared to the United States. Thus, the role of the face-to-face meetings are of greater significance in determining the specifications. On the other hand, agile development and the outsourcing of effects, motion capture, sound, and debugging has become more common. Therefore, frequent meetings depending on the development status are essential. Conducting most meetings at the development site also allows for a better understanding of the current development status and has the benefit of leading to smooth progress in development. These are some of the sample of narrow cluster's superiority. These are the reasons why industries are so heavily concentrated in Tokyo and is evidence of clusters functioning effectively.

On the other hand, due to differences in geographic size when comparing the United States to Japan, dynamic changes accompanying movement are limited to some personnel, such as the position of a person or a heavy responsibility. From our interviews with a senior producer in the

development department at one of the publisher in the US, we found that California is a well-known and a dynamic tech industry. In California, it is common for talented people working in the vibrant movie and tech industries in Hollywood and Silicon Valley to switch jobs. 54% of all workers in the US gaming industry are employed in California (ESA, 2017). Note that this percentage includes workers in non-developer roles in the game development department. Hence, California can be considered to be an important gaming industry hub. Also, from our interview with a game consultant, we found that within California, it was common and extremely easy of workers to move between Silicon Valley in the north and LA in the south, since they are in the same state. Many of these developers are limited to what roles they can put their expertise to use, so it is common for them to mostly sign contracts per-project.

When switching jobs, most find new jobs through public listings, but it is a common practice for people of the gaming industry to find their next jobs through recommendations from friends and word-of-mouth. News of new jobs through word-of-mouth is popular. Many of these cases are with former coworkers and business partners, and even if they are currently working in different industries, they are typically people who have left their mark. Among art workers, planners and CG designers etc., there are many game publisher/development companies in LA. It is especially true that CG technologies for the movie industry in Hollywood tends to be one step ahead of the gaming industry. However, many talented people in the film industry realize the attraction of the interactive elements of games, which movies lack. (Masuda & Kohda, 2016). Currently, the US gaming industry is growing. Therefore, many talented people in the film industry, who are interested in games, have come with their know-how. Not only do they understand the technology knowledge but they also have effectual knowledge on how to move forward in the gaming industry (Masuda & Kohda, 2016). Looking to the industry-academia cooperation in Silicon Valley, companies have strong relationships with universities in the area, such as Stanford and UC Berkley. Furthermore, unlike in Japan or on the US East Coast, it is relatively easy to receive funding from venture capital firms. This environment makes it easier for people to start companies and large-scale research and development. These two facts have had positive effects on the gaming industry, as well as other sectors of the tech industry.

Silicon Valley's population is said to be approximately 3 million people, with many researchers and developers from India and other parts of Asia making significant contributions.

There are three international airports in the San Francisco Bay area including the Silicon Valley. People, not just from the above mentioned countries, but from all across the world are coming in and supporting the tech industry, both in the US and globally. During our interview, a board member of a large-size US publisher mentioned, that within the Silicon Valley cluster there are a diverse set of cultures, and the people in it hold different values. From this, it can be inferred that it would be difficult to move development forward with the vague specifications common to Japan. Hence, both R&D and business management would not have a shared understanding of many of the specifications, that goes without saying applies too in Japan. In other words, many clusters can make the IT industries and the game industries excellent. To

keep and maintain human resources in the US, it is strongly recommended to have clear specifications.

In contrast, although it is also located on the US West Coast, both Nintendo of America and Microsoft have headquarters in Seattle, but the game software development industry is not as vibrant as California (ESA, 2017). Up until 2000, when Nintendo's hardware was dominating the global market, many in the gaming industry set up their offices in Seattle. Japanese companies also tended to set up US branches in Seattle. However, there are currently no major developments in terms of software development. The same is true for Microsoft. Much of game development is centered in California (ESA, 2017). However, the situation is different in Canada. Vancouver's entertainment industry has developed over the years, initially as a subcontracting region for Hollywood. After that the diverse parts of the entertainment industry—CG, sound, effects, as well as the game industry—have flourished. Vancouver has done especially well due to in part a favorable tax policy. With the reduced tax rates from the Government of Canada (17%) and the Province of British Columbia (17%) put together, approximately 40% of taxes are waived for these companies. This benefit can then be diverted to employees' pay. This has given rise to a tight cluster which has resulted in having games becoming global hits (GAME WATCH, 2016). These policies, combined with the fact that culture is very similar to the US, have made Canada the world's third largest game development country after the US and Japan.

## **6. CONSIDERATION**

This study, in addition to examining previous studies, investigated the effects of geographical superiority in game development through interviews with key people who have: responsibilities in R&D, management, board members, US and Japanese game publishers, consultants, and so on. As stated previously, we could not observe a clear instance of geographical superiority in Japan. However, a cluster can be found in Vancouver as well as in Hollywood. When comparing these two places, it can be seen that the clusters formed in different ways. The film industry of Hollywood had initially developed on the East Coast, but is now mainly on the West Coast, as the industry faced legal problems and also sought the warmth of the Mediterranean, which is suitable for filming. Similarly, Vancouver is located on the West Coast in North America, which is a suitable location for filming as the weather is temperate throughout the year, the location offers great scenery and there is one of the strengths point which has no time difference with California. These also provided the advantage of cheaper productions. As a consequence, Vancouver is a city that has been contributing to the growth of the gaming industry's cluster.

In terms of game development, checking progress, adjusting the schedule, and bringing ideas in pursuit of games that offer more excitement and realistic sensations, are all accomplished through frequent meetings with those involved. In the game development process, even with advanced technology, many adjustments still have to be done manually. This creates a problem because, there are time constraints and limits to human ability. In the final stages of each

development, those involved have to work for long hours, and the informative meetings for creating final master version become indispensable. In this difficult environment, a large number of the US game companies have shown initiative to create standards for game development. The US aims for efficiency, and an environment which allows developers to contribute immediately and directly after transferring to a different company.

Also because of this diverse environment, a large number of the US game companies have introduced standardization development engines (unity, unreal etc.) as an initiative that aims for efficiency. Introducing standardization development engines in a company may benefit not only the company but also the artists and engineers. First, artists and engineers can discuss games using the same tools. Second, it is easy to respond to the sudden increase and decrease in workers. Viewed from the management perspective, a company can save the time and cost to develop their own engine. Also, in regards to the mobility of talented people, they could contribute immediately and directly after transferring to a different company. Both companies and workers can make a win-win relationship by using standardized development engines. Of course, it has some disadvantages. For example, realistic CG depiction, speed, capture and so on.

Standardization is often seen in IT industries other than the gaming industry, but comparing the US and Japan indicates that the US shows more progress in explicit knowledge, and interviews with numerous developers' position have confirmed their view that efficiency in standardization is high. This comparison is consistent with the vagueness of Japanese specifications mentioned in the previous section. In the US, developing according to the specifications can lead to its completion, and the quality of specifications is much more advanced than in Japan. In Japan, the culture of discussing and creating to reach completion strongly persists. Both ways have their advantages and disadvantages, but the latter requires more labor for regular meetings, and this means that development is slower. The method in the US, which is to firmly establish the specifications and prioritize the deadlines, is far more advantageous for developing game software that has a set deadline, such as sports games. Furthermore, if the specifications are firmly established, the developers are able to communicate sufficiently using conference calls and various development kits even if they are working remotely, so that the meetings do not hamper progress.

In Japan, research development is centralized in Tokyo; a cluster phenomenon that arose naturally. Although it is different to the case of the West Coast in the US, it is thought that the current game's development system arose from the proximity of the entertainment industries aggregated in Tokyo, and the culture of tacit knowledge caused by vague specifications. In comparison, although the US has implemented methods such as agile software development, it has been focusing on explicit knowledge and improvement in efficiency. In conclusion, these factors show that the differences between the current development systems in the US and Japan is one of the reasons why the US is now the dominant country in the global market. The following figure, figure 1, shows this phenomenon.

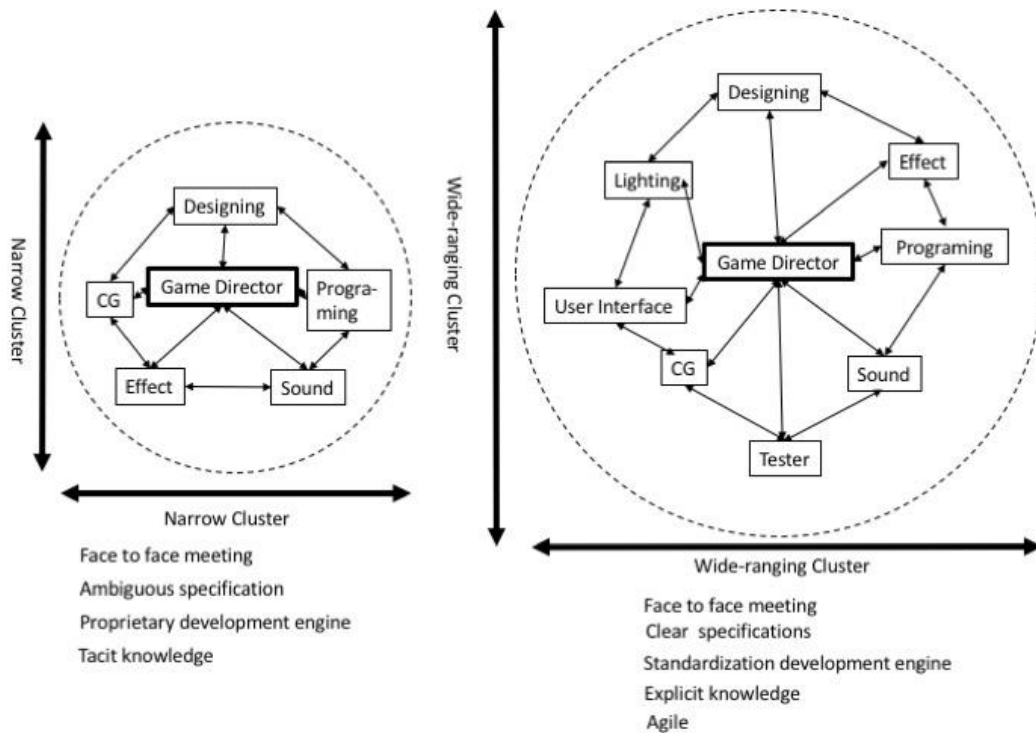


Figure 1: Visual representation of the proximity of related industries aggregated in a narrow (Japan) and wide-ranging (the US) cluster

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## REFERENCES

Cornelia, S., Federico, R., Moritz, J. (2014). Mobility and innovation: *A cross-country comparison in the video games industry*, Elsevier, pp. 122–128.

Fukuda K., (2012), Emergent Innovation and strategy formation by the video game development companies (in Japanese), *Core Ethics*, 8, 364–365.

GAME WATCH (2017). Retrieved from <http://game.watch.impress.co.jp/docs/news/744678.html> (in Japanese)

Harada, S. (2009). On M. Porter's clustering: competitiveness and policies of industry clusters (By Japanese) *Japanese Institutional Repositories Online*, Nagaoka University 7pp.21-42, 2009-07 ISSN:1883-1583.

Hanzawa, S. (2008). Characteristics of the Division of Labor and Geography in the Japanese Home Video Game Industry (By Japanese) *Geographical Review of Japan* Vol. 78 (2005) No. 10 607-633.

Ikuine, F. (2012). Development productivity dilemma (in Japanese), Yuhikaku, pp. 254–318.

Lee J. J. Jr., & Holt R. (2006). *The Producer's Business Handbook*, Elsevier, pp. 139–172.

Masuda, K., & Kohda Y. (2016). Mobility of human resources from the film production industry as the key to success of United States game manufacturers. *Proceedings of the 10th International Conference on Project Management (ProMac 2016)*, pp. 847-853.

Ogawa, S. (2011). Recent Development in Video Game Technology in Japan (in Japanese). *Toyo University Repository for Academic Resources*, pp. 6–14.

Okamoto, M. (2011). *For concentration in the home video game industry (in Japanese)*, Research Organization of Information and Systems, pp. 7–11.

Michle, P. E., Takeuchim H., & Sakakibara, M. (2000). Can Japan compete? (in Japanese) *DAIAMOND, Inc.*

SIWEK E. S (2017) VIDEO GAMES IN THE 21<sup>ST</sup> CENTURY *Entertainment Software Association (2017)*

Tanaka, S. (2005). Innovation and Industrial Organization (in Japanese), Taga Shuppan, pp. 83–90.

Wada, T., Icgikohji, T., Hanzawa, S., Ikuine, F., & Zhang. (2012) Survey report on the industrial cluster and possibilities of innovation management in the game industry of Fukuoka (By Japanese) *Manufacturing Management Research Center*