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Article

Organizational Ambidexterity and Firm Performance: Effect of Two Types of Exploitation on Japanese Video Game Industry

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Abstract
Recent organizational ambidexterity studies have discussed the importance of achieving a balance between Exploration and Exploitation. However, existing studies have not distinguished the detail of exploitation; this study categorizes exploitation as 'Repetitive Exploitation' and 'Incremental Exploitation.' Our study contributes to ambidexterity studies by analyzing the impact of a combination of both these types of exploitation and exploration on a firm's performance. We used 647 observations from Japanese video game industries between 1997 and 2019 for panel data analysis. In line with existing studies, we proved that firm performance increases when a balance between exploration and exploitation is achieved. At the same time, we found that firms with a lower exploration performed better when the rate of incremental exploitation was high. The results of our study suggest that even when the firm's ambidexterity is imbalanced, different results can be expected when both types of exploitation are considered. The Study has implications for organizations to improve their performance.

Keywords: Ambidexterity; Incremental Exploitation; Repetitive Exploitation; Video Game Industry.

1. Introduction

Exploration and exploitation have been receiving growing attention in corporate strategy and organizational learning. Many researchers have focused on the relationship between the two, and their impact on firm performance and innovation (Jansen, Simsek, & Cao, 2012; Lavie, Stettner, & Tushman, 2010). The effect of ambidexterity, which combines exploration and exploitation, on firm performance has been the subject of much research.

However, the empirical evidence on the effects of ambidexterity on performance shows mixed results; some studies show that higher levels of ambidexterity lead to positive relationships (Katlia & Ahuja, 2002), while others have found no relationship (He & Wong, 2004) or a negative relationship (Atuahene-Gima, 2005). Owing to the ambiguity of these results, Junni et al. (2013) conducted a meta-analysis of ambidexterity studies, arguing that these (varying) results are due to different assumptions, measurement methods, and levels of analysis in each study. The results of the meta-analysis showed a positive relationship between organizational ambidexterity and performance. This relationship was also supported by subsequent studies (Luger, Raisch, & Schimmer, 2018; Papachroni, Heracleous, & Paroutis, 2015; Lennerts, Schulze, & Tomczak, 2020).

Previous studies have measured exploration and exploitation on various scales, but they have not distinguished between the two types of exploitation. In some cases, exploitation is just a repetition of knowledge, while in others, it refers to expansion and development of new knowledge or technologies. Though Piao and Zajac (2016) have categorized exploitation as 'Repetitive' (i.e., repetition of existing designs for existing products), and 'Incremental' (i.e., creation of new designs for existing products), and have analyzed their effect on subsequent exploration, their study does not address the effect of different combinations of exploration and the two categories of exploitation on

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firm performance. Thus, saying "exploitation" has different effects on firms depends on the specifics of the exploitation.

Exploration and exploitation are mutually interactive in corporate activities (Lavie et al., 2010), and it is proven that there is a strong relationship between exploitation and firm performance (Junni et al., 2013). As such, it can be presumed that the combination of exploration and the two types of exploitation also affects firm performance. This study aims to contribute to the study of ambidexterity by analyzing the impact of exploration and both types of exploitation on firm performance.

Using 647 firm-year observations from 1997 to 2019 in the Japanese video game industry, our study analyzes the relationship between exploration and incremental/repetitive exploitation on firm performance. Our results show that higher ambidexterity balance in a firm leads to higher performance. At the same time, firms with low exploration achieved higher performance when the incremental exploitation was high. The result of this study provides new insights to the relationship between exploration and exploitation.

This paper first highlights the Theory and Hypotheses relating to the combinations of both incremental and repetitive exploitation and exploration, and how their balance affects a firm's performance. Thereafter, it defines the research methodology and results obtained from the analysis. Finally, it presents the conclusion and a brief discussion on the results of the Study.

2. Theory and Hypotheses

Theoretical background

In organizational learning literature, organizational activities have been defined by two perspectives: exploration and exploitation. March (1991: 71) defined exploration as activities relevant to "search, variation, risk-taking, experimentation, play, flexibility, discovery, and innovation" and exploitation as activities relevant to "refinement, choice, production, efficiency, selection, implementation, and execution." Exploration leads to the acquisition of new knowledge through learning and innovation, whereas exploitation leads to the continued use of past knowledge bases (Vermeulen & Barkema, 2001).

Because of the strong correlation between exploration and exploitation, many researchers have emphasized ambidexterity, which combines both, as a concept of dual orientation of the firm (e.g., Gibson & Birkinshaw, 2004; He & Wong, 2004; Lubatkin, Simsek, Ling, & Veiga, 2006; O'Reilly & Tushman, 2004; Tushman & O'Reilly, 1996). Balance between exploration and exploitation has been a major part of ambidexterity research (Stieglitz, Knudsen, & Becker, 2016). This is because both exploration and exploitation are important aspects of an organization and combining them enhances firm performance (He & Wong, 2004; Junni et al., 2013). Conversely, a deviation toward either of these concepts can lead to a competency trap, thereby reducing firm performance and survival probability (Levitt & March, 1988). Therefore, being in a state of ambidexterity is critical to a firm's success.

In a state of imbalance between the two, especially when exploration is high, firms can acquire a variety of information through exposure to various sources of knowledge (Beckman, 2006), but it is difficult to obtain adequate returns on the costs of exploration and experimentation. Additionally, high exploration results in slower absorption and adaptation to and assimilation of new knowledge in the organization (Zahra & George, 2002). On the other hand, when exploitation is high, firms tend to avoid risk and focus on short-term performance. Moreover, the improvement in performance is temporary, and unable to keep up with technological or environmental changes (Tushman & Anderson, 1986). Also, when exploitation is high, firms acquire little new knowledge or resources, and the scale of the effect of exploitation is limited (Cao et al., 2009). Therefore, investing in an appropriate balance between exploitation and exploration is important for a firm's success (Utterback, 1994).

When exploration and exploitation are balanced, the organization can fully utilize existing knowledge and resources to acquire and create new knowledge. At the same time, new knowledge can integrate and strengthen existing knowledge and resources. Many prior studies suggest that balanced ambidexterity lowers failure risk and improves firm performance (Cao et al., 2009; Gibson & Birkinshaw, 2004; March, 1991). Thus, the balance between exploration and exploitation activities should be maintained for the long-term success of a firm (Lee & Puranam, 2016; O'Reilly & Tushman, 2013; Raisch & Birkinshaw, 2009).

However, the empirical evidence on the effects of ambidexterity on performance is mixed. While some studies show positive effect (Gibson & Birkinshaw, 2004; Lubatkin et al., 2006), others show insignificant (Venkatraman, Lee, &

Iyer, 2007; Lennerts et al., 2020), or even negative effect (Athuahene & Gima, 2005). Also, in studies focusing on the balance between exploitation and exploitation, high exploitation needs to be combined with high exploration (i.e., a high-high combination) to achieve superior performance (Lennerts et al., 2020). Owing to these variations, i.e., positive effects of a high-high combination (Katila & Ahuja, 2002) to insignificant (He & Wong, 2004) or negative effects (Atuahene-Gima, 2005) on a firm's performance, it is assumed that exploration and exploitation do not have a simple relationship.

Junni et al. (2013) attributed these mixed results to different measurement scales, levels of analysis, research design, and other issues in each study. They performed a meta-analysis of existing organizational ambidexterity studies and suggested that the relationship between ambidexterity and performance is strongly influenced by moderator variables, but the relationship between balanced ambidexterity and performance itself is a positive. Later studies have also substantiated that ambidexterity improves firms' competitive advantage and performance (Luger et al., 2018; Papachroni et al., 2015; Lennerts et al., 2020). Therefore, controlling for other variables, we suggested that higher balanced ambidexterity positively related to firm performance.

H1. Balanced ambidexterity is positively related to a firm's performance

Repetitive exploitation and incremental exploitation

While existing studies on ambidexterity, including the previous studies addressed in Junni et al. (2013), measured exploration and exploitation on various scales, they have not distinguished between the two types of exploitation. Exploitation is not necessarily expected to be unique. This means that exploitation may simply be a repetitive use of knowledge, or it may be an evolution of the existing knowledge.

Piao and Zajac (2016) state that there are two types of exploitation: repetitive exploitation and incremental exploitation. They define repetitive exploitation as "the repetition of existing designs for existing products"; as per March's (1991: 71) description, "production," "efficiency," "implementation," and "execution" are applied in repetitive exploitation. Incremental exploitation is defined as "the creation of new designs for existing products,"; as per March's (1991: 71) description, "refinement", "choice", and "selection" are applied in the incremental exploitation. Their study examines the impact of both types of exploitation on likelihood of future exploration. The results suggested repetitive exploitation decreases exploration and delays the response to environmental changes, while incremental exploration increases exploration and hastens the response to environmental changes. Acevedo and Díaz-Molina (2019) also assumed that incremental exploitation affects incremental innovation and repetitive exploitation affects operational efficiency. Thus, the impact of simply saying "exploitation" has a different effect on firms according to the nature of the exploitation.

However, while existing studies have examined the impact of repetitive and incremental exploitation on subsequent exploration or the independent effect, they have not discussed how the combinations of exploration and repetitive/incremental exploitation affect firm performance. Therefore, we will discuss the effect of combinations of exploration with both types of exploitation on a firm's performance.

The impact of exploration and repetitive/incremental exploitation

Incremental exploitation leverages knowledge and resources that a firm already has, to create something novel (Piao & Zajac, 2016). Therefore, while using existing resources, actual activities are conducted on a trial-and-error basis, linking different knowledge and resources combinations to generate later exploration (Lichtenthaler & Ernst, 2012). Therefore, incremental exploitation improves the organizational ability to explore. This can lead to organizational stimulation and the creation of new innovative products (March, 2008). Also, whereas exploration is associated with radical innovation, incremental exploitation is associated with incremental innovation, so its risk is lower (Acevedo & Díaz-Molina, 2019). Furthermore, using incremental resources to enter new markets is less costly than entering new markets independently (Sakhartov & Folta, 2015).

On the contrast, the nature of incremental exploitation is similar in some respects to exploration and is not necessarily associated with organizational stability. Since the prospects of the final products are uncertain, adaptability issues with the existing organization may arise (Moore, 1991).

Repetitive exploitation is the reuse or reproduction of something that has already been successful to a certain level within a firm (Denrell & March, 2001; Piao & Zajac, 2016). Since existing assets are used, it is easier to predict outcomes from repetitive exploitation, making it less prone to critical failures (Denrell & March, 2001) and less likely to make mistakes because of short cognitive distance (Nooteboom, 2000). Even if it fails, the losses in time and cost

are minimal (Holmqvist, 2004). For these reasons, repetitive exploitation is likely to reduce organizational risk and provide stable returns, but at the same time, its use is unlikely to acquire new knowledge. Therefore, though it may lead to a revenue increase the short-term, it could impact the firm's revenue and survival when viewed from a long-term perspective. Since the use of repetitive exploitation also reduces the absorb capacity and employees focus only on continuous improvement and learning (Camisón, Boronat-Navarro, & Forés, 2018), there will be delayed adaption to innovative technologies or environment changes (Lubatkin et al., 2006).

In firms with low exploration, a focus on repetitive exploitation will lower the viability of the organization. Conversely, decreasing repetitive exploitation and increasing incremental exploitation will lead to an organization's innovativeness both, by acquiring new knowledge, and creating synergy with existing knowledge. In summary, increasing repetitive exploitation in firms with low exploration is likely to reduce the ambidexterity balance, thereby decreasing opportunities for new findings, and resulting in poor performance. Therefore, the firms with low exploration should increase incremental exploitation to achieve ambidexterity balance and improve organizational performance.

H2a: For firms with low exploration, there is a positive relationship between incremental exploitation and firm performance.
H2b: For firms with low exploration, there is a negative relationship between repetitive exploitation and firm performance.

Likewise, focusing on incremental exploitation in firms with high exploration leads to a synergistic increase in the risk of failure. Additionally, the increased cost and time to combine existing and new knowledge make it difficult to achieve desirable outcomes (Lubatkin et al., 2006). Conversely, decreasing incremental exploitation and increasing repetitive exploitation will reduce the risk of such failures thereby leading to organizational stability. In summary, increasing incremental exploitation in firms with high exploration is likely to reduce the ambidexterity balance, thereby increasing uncertainty risk and resulting in poor performance. Therefore, the firms with high exploration should increase repetitive exploitation to achieve ambidexterity balance and improve firm performance.

H3a: For firms with high exploration, there is a negative relationship between incremental exploitation and firm performance.
H3b: For firms with high exploration, there is a positive relationship between repetitive exploitation and firm performance.

Ambidexterity consists of both, exploration and exploitation, but their relationship is treated differently by different papers. Some studies treat both as continuum variables (Heyden, Oehmichen, Nichting, & Volberda, 2015; Lavie et al. 2010; March, 1991), while others treat them as orthogonal variables (Gupta, Smith, & Shalley, 2006; Katila & Ahuja, 2002). In this study, we treat exploration and exploitation as continuum variables. This is because once new knowledge is developed to create content, it is left to exploitation to make use of that knowledge (Lavie et al., 2010). Of course, the acquisition of new knowledge involves exploration, but that knowledge is made more accessible through exploitation. As the knowledge acquired in the exploration is transformed into exploitation when subsequently used, both are seen as an extension of each other rather than being independent, therefore, we treat them as continuum variables (e.g., Brunner, Staats, Tushman, & Upton, 2010).

3. Research Method

In this study, we conducted a statistical analysis of the Japanese video game industry including data from 1997 to 2019. There are two reasons why the video game industry was appropriate for our study. First, the important variables necessary for the analysis can be easily measured in the video game industry. When firms develop new games, they often use internal resources, including incremental exploitation and repetitive exploitation. Therefore, we can see the impact of both types of exploitation. Second, firms can choose which resources to use in game development. Thus, it can be seen as a reflection of the firm's strategy of whether to give more importance to exploration or exploitation. We used data from "The Annual Game Industry Report 1997-2020" for the analysis. Although data from year 1997 to 2019 was used for our analysis, game titles released in 2019 were not included because some of these were released just before the measurement period of the data source and do not necessarily reflect actual sales. Therefore, we only used 2019 data on cumulative sales of game titles released before 2018.

During the observation period, 572 new game titles were released in Japan on an average every year (game released on multiple platforms with the same title is counted as one). “The Annual Game Industry Report” included only the

top 1,000 sales for the year, but on average, 85.2% of new released games data were included in our dataset. Of the excluded data, 51.2% had less than 2 months of measurement period[1]. Therefore, we conclude that the video game data were sufficiently covered in our dataset. Each game title was compiled by firm-year, and we removed firms with only a single firm-year data. The final sample contains 97 firms and a total of 647 usable observations.

Dependent variable

Average Sales Growth Rate. In this study, we used the *average sales growth rate* as a measure of firm performance. Although Return on Assets (ROA) or sales growth rate should normally be used, we considered it difficult to use it as an indicator because of the problems in collecting performance measures for many unlisted companies. The sales growth rate is defined as the average sales of all game titles released by a firm in year *t* divided by the average sales in year *t-1*. The *average sales growth rate* in year *t* was then defined as the average of sales growth rate in the last three years (He & Wong, 2004). Sustained sales growth rate has been found to be a reliable proxy indicator of long-term firm performance (Henderson, 1999).

The three-year measurement period was chosen because the development time for most game software is usually lesser; the average game development time is about 16 months, and 91.5% of games have a development time of less than two years (Computer Entertainment Supplier's Association, 2015: 16). Except about 6.7% of games that take more than three years to develop, most game titles would accrue returns on investment within three years.

Independent variables

Balance. To measure *balance*, we follow He and Wang (2004) and use the absolute difference between $exploitation_{t-1}$ and $exploration_{t-1}$, such as $|(1-\alpha)-\alpha|$ for analysis. Also, to facilitate interpretation, to follow Cao et al. (2009), we reverse this measure by subtracting the difference score from 1 so that a higher value indicates greater balance dimensions.

Exploitation. $Exploitation_{t-1}$ was measured as the sum of $Incremental\ exploitation_{t-1}$ and $Repetitive\ exploitation_{t-1}$. $Incremental\ exploitation_{t-1}$ was measured by the number of game titles with sequels of existing game series and game titles using game characters[2] in year *t-1* divided by the total number of titles in year *t-1*. These titles were determined to be *incremental exploitation* because the worldview, characters, design, and other aspects could be appropriated from the existing game, but the stories, systems, and genres had to be newly constructed.

Repetitive exploitation. $Repetitive\ exploitation_{t-1}$ was measured by the number of remakes, remastered editions, best editions, and collection editions titles released in year *t-1* divided by the total number of titles in year *t-1*. A remake or remastered edition is a remastering of a previous work using the latest technology, which may include some additional elements, but in most cases the content itself is not changed significantly. The best editions are low-priced versions of previous titles with the content unchanged in most cases. Collection editions are those wherein several previous series of titles are sold together. These game titles were considered *repetitive exploitation* because they largely used previous titles in their entirety. Additionally, titles that contain elements of both incremental exploitation and repetitive exploitation (e.g., remastered versions of series sequels) were also counted as repetitive exploitation because there are few new elements to be developed[3].

Exploration. $Exploration_{t-1}$ was measured by the number of titles that did not correspond to $repetitive\ exploration_{t-1}$ and $incremental\ exploration_{t-1}$ in year *t-1*, divided by the total number of titles in year *t-1*. The first of a series that doesn't use a character and later has a sequel is counted here, since it is considered a new game at the time of its release.

Proportion of Incremental Exploitation. Following Piao and Zajac (2016), our study defined *Proportion of* $incremental\ exploitation_{t-1}$ as $incremental\ exploitation_{t-1}$ divided by the sum of $repetitive\ exploitation_{t-1}$ and $incremental\ exploitation_{t-1}$. Therefore, the closer to 1 means a higher rate of incremental exploitation.

Control variables

Firm size was measured by the number of game titles, because data on the number of full-time employees (Baum et al., 2001) and capital was difficult to access. Also, since the development time per game title is about 16 months, we determined that the number of titles reflects the size of the firm, because more employees and capital are required to increase the number of titles. *Firm age* was assessed as the number of years since establishment. The variable is included to account for the routines and levels of experience that were built up within a firm and are available as a resource (De Vaan, Stark, & Vedre, 2015). *Industry sales* were measured as the total sales of the entire video game industry. *Platform diversification* - the Herfindahl index was used to measure the degree of platform diversification

of each firm (Montgomery, 1982). The choice of which platform (e.g., Nintendo Switch, Play Station 5, Xbox Series X/S) to sell a game on is important. The more major platforms will expect to increase sales volume, but this also means more competitors. Also, developing a game title on the newest platform is a new learning experience, which means more opportunities for trial and error, which can extend development time. However, it is presumed that firms with higher diversity of platforms are more likely to handle changes and problems in the environment. *Platform diversification* was calculated based on 25 platforms that existed during the observation period, as per the "The Annual Game Industry Report". *Genre diversification* - the Herfindahl index was used to measure the degree of genre diversification of each firm. Video games in highly competitive genres are benchmarked against more and possibly higher quality games which are expected to influence sales (De Vaan et al., 2015). In Japan, RPG and action genres are popular, so the influence of genres was controlled. Genres were classified into 12, based on " The Annual Game Industry Report." We also added *year dummy* as a control variable.

Statistics method

In comparison with previous organizational ambidexterity studies which mainly employed a cross-sectional research design (Junni et al., 2013), our data are structured as panel data because panel data lessens the risk of confounding correlation with causation (Luger et al., 2018). All independent variables and control variables are lagged by one year, relative to the dependent variables in analysis, to facilitate causal inference. To test our hypotheses, we chose fixed-effect model for our analysis to control firm-level unobservable factors. All statistics in our study were performed using Stata 14.

4. Results

Table1 shows mean, standard deviation and correlation matrix of all variables in our analyses. Table 2 presents the results of the regression analyses. Model 1 contains all control variables in the analyses. Models 2-4 added independent variables and tested hypotheses 1-3. In Model 2, the balance was positively significant (b=.224, $p<0.10$), supporting Hypothesis 1. In other words, the more balanced the exploitation and exploitation, higher the average sales growth rate. Model 3 shows the impact of incremental exploitation and repetitive exploitation on the firms with the lowest proportion of exploration (the bottom 50% of exploration). In Model 3, the variable of proportion of incremental exploitation was positive and significant (b=.417, $p<0.05$), which supports Hypotheses 2a and 2b. That is, firms with lower exploration increase their average sales growth rate as the proportion of incremental exploitation increases, while average sales growth rate reduces as the proportion of repetitive exploitation increases. Model 4 shows the impact of incremental exploitation and repetitive exploitation on the firms with the highest proportion of exploration (the top 50% of exploration). The variable of proportion of incremental exploitation was negative, but since its effect was insignificant, Hypotheses 3a and 3b were not supported. The effects of Model 3 and Model 4 are visually presented in Figure 1

Table 1. Descriptive Statistics and Correlation Matrix

Variables	Mean	SD	1	2	3	4	5	6	7
1. Average sales growth	1.35	1.40							
2. Balance	0.35	0.36	0.10**						
3. Proportion of incremental exploitation	0.58	0.38	0.11**	0.82***					
4. Firm size	7.98	11.64	-0.08*	0.23***	0.37***				
5. Firm age	26.56	19.16	-0.04	0.09***	0.17***	0.31***			
6. Industry sales (Billion yen)	494.9	113.6	-0.09*	0.02	-0.02	-0.02	-0.07*		
7.Platform diversification	0.29	0.28	-0.09*	0.40***	0.52***	0.53***	0.27***	0.06*	
8. Genre diversification	0.35	0.32	-0.08*	0.43***	0.53***	0.56***	0.34***	0.04	0.65***

*p<0.05, **p<0.01, ***p<0.001

Table 2. Regression Results

DV: Average Sales Growth	Model1	Model2	Model3: Low Exploration	Model4: High Exploration
Firm size	-.056	-.057	-.042	-.097*
	(.103)	(.201)	(.340)	(.084)
Firm age	-.023	-.008	-.074	.118*
	(.562)	(.880)	(.158)	(.071)
Industry sales	.353	-.121	.188	-3.93
	(.374)	(.798)	(.699)	(.174)
Platform diversification	-.058	-.023	.008	-.004
	(.739)	(.904)	(.973)	(.976)
Genre diversification	.018	.051	.174	.028
	(.911)	(.780)	(.475)	(.851)
Balance		.224*		
		(.063)		
Proportion of incremental exploitation			.417**	-.134
			(.040)	(.281)
Year dummy	Included	Included	Included	Included
Adjuster R^2	.054	.062	.072	.056
F	1.54*	1.72*	3.68***	1.30
N	647	647	476	171

*p<0.1, **p<0.05, ***p<0.01.

Values are standardized regression coefficients, with *p* value in parenthesis.

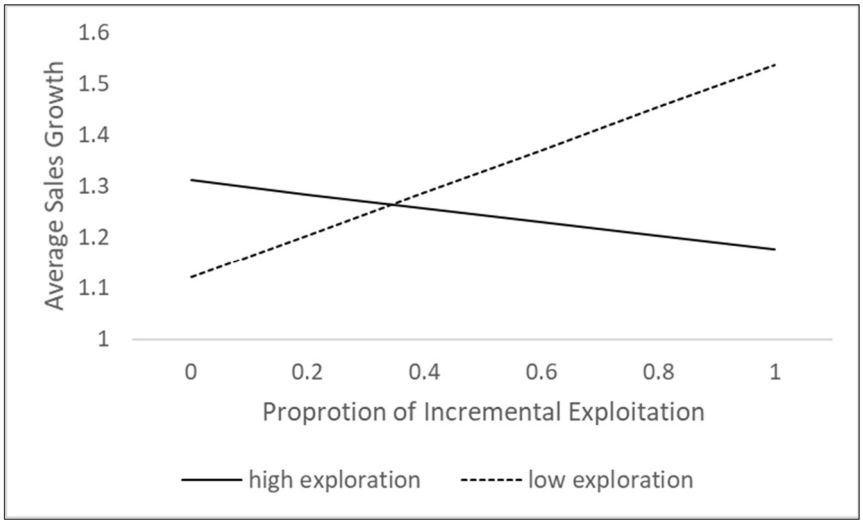

Fig.1. Moderating effect of exploration

5. Discussion and Conclusions

This study clarifies the relationship between exploration and exploitation on firm performance by dividing exploitation into incremental and repetitive exploitation, which have been grouped together in previous studies of ambidexterity. The results of our study make several contributions to ambidexterity studies.

First, we proved that ambidexterity and performance are positively related, but this relationship differs when exploitation is categorized further.

Second, the results of this study's analysis imply a complementary relationship between exploration and incremental exploitation. In previous research, conflicting views suggest that exploitation disturbs exploration (Levinthal & March, 1993), while complementary views suggest that exploitation complements exploration (Zollo & Winter, 2002). The results of our study confirm that firms can achieve high sales growth rates by increasing the proportion of incremental exploitation even when the exploration is low. This result suggests that by focusing on incremental exploitation, exploration and exploitation can complement each other. However, increasing repetitive exploitation did not lead to an increase in sales growth rate when exploration was high. This might be because repetitive exploitation, which simply means the reuse of resources, has a weak relationship with exploration, thereby suggesting that both have independent effects.

Also, our findings have several managerial implications. The results of our study provide suggestions to industries utilizing intangible assets, e.g., the video game industry, on how these assets should be explored and exploited. Firms need to constantly make new products and ideas for their growth, but it is not always possible to continue constant exploration. When exploration does not work well, organizational performance could be complemented by increasing the proportion of incremental exploitation and rely for a while on incremental innovation.

Despite these contributions, there are some limitations in this study.

First, whether a game title includes a character or not is based on the author's subjective view, so the reliability of the classification is not necessarily ensured. Therefore, it is necessary to ensure the reliability by confirming the consistency in multiple researchers and measuring Cohen’s kappa coefficient.

Second, many game development firms have also entered the smartphone game industry since around 2010; the impact of this on the video game industry is not insignificant. In fact, there have been cases wherein popular smartphone games have been adapted and released as video games, so the relationship between the two industries may need to be considered in future analyses.

As a direction for future research, this study estimates the growth rate over a three-year period, but different results may be found when observed over a longer period. For example, although repetitive exploitation did not show a significant impact on firm growth rate, the development of game software through repetitive exploitation is often assigned to newcomers with little experience. Therefore, from a human resource development perspective, it may have an impact on the long-term survival of the firm. This may lead to new findings in the long run.

Although this study focused only on Japan, it is expected that more accurate analysis would be possible by including overseas as well. This is because some firms focus on overseas sales and game titles are produced with the goal of increasing worldwide sales. So, a poor sale in Japan does not necessarily mean failure. Since non-Japanese firms do not necessarily make products for the Japanese market, it is difficult to determine success or failure based solely on Japanese domestic data. Therefore, the inclusion of foreign data would further enhance the elaboration of this study.

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Data Availability Statement
Raw data were generated at the *Media Create* (https://www.m-create.com/english/). The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest
The author declares no conflict of interest.

Appendix
1 For the excluded data, due to data unavailability, calculations are based only on 2019 data.
2 Character games were determined by whether the title included the firm's specific game character name or not. For example, Nintendo: “Yoshi’s Crafted World”, Capcom: “Rockman X command mission”, Sega: “Sonic Chronicles: The Dark Brotherhood”. Underlined parts are names of firm’s specific character. As these data do not exist, classifications were made by authors subjective.

3 The detailed priorities for exploitation classification are as follows. Each of the games is considered to fall into the classification of higher priority one.
Collection > Best > Remaster > Remake > Sequel > Character > Not applicable (Exploration)

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