

Resource allocation at organizational level. To evaluate resource allocation at organizational level, we generated three items that describe the extent to accumulated organizational know-how, knowledge and skills. For example, “Know-how and skill that our company has accumulated in the long term were useful,” “The research and development system of our company was useful”, and so on. These items are also formed into a single scale ($\alpha=0.81$) which is named “accumulated organizational capability (*accumulated OC*)” (mean=2.87, s.d.=1.01). In addition, two other items for assessing the extent to resource allocation at organizational level were also prepared: Improved equipment and experimental tools (*Improved equipment*), and patents that the company holds (*patents*). These are single items (mean=3.08, 2.25, s.d.=1.34, 1.27, respectively).

Resource allocation at group level. Two items are prepared to measure resource allocation at group level. The question items are “Teamwork contributed to success of our project (*teamwork*)” and “Interactions with the sales department and customers were useful (*interactions*)”. Both are assessed on a 5-point scale (mean=3.33, 3.28, s.d.=1.12, 1.32, respectively).

Resource allocation at individual level. Two three-items measured the extent to resource allocation at individual level. One is “accumulated individual’s capability (*accumulated IC*)” indicated individual efforts, individual learning through trial and error, and approaching a problem from various aspects. Three items were formed to one scale ($\alpha=0.89$, mean=3.69, s.d.=0.87). The other is “Index of active learning by individual (*Index of LI*)” developed by Ando (2001), which converted three items into a single scale ($\alpha=0.77$, mean=3.00, s.d.=0.65). Only this scale was measured by 4-point.

External resources. To assess the status of utilization of external resources, we generate two single-items. One is “Cutting-edge technology in industry was useful (*technology outside*)” (mean=2.81, s.d.=1.117) and the other is “Information and idea from external research institution and universities was useful (*information outside*)” (mean=1.94, s.d.=1.07). Both items are measured on a 5-point scale.

RESULTS

Data characteristics

First of all, we need to verify the characteristics of the datasets. As above stated, respondents were required to answer the question, recalling two different R & D events they have experienced before. One is the R & D activity brought to increase sales and

profits (dataset A). The other is the R & D activity contributed to solution of technical issues and technological development (dataset B).

To investigate the differences between these two datasets, the average score of two independent variables of each dataset were calculated. Figure 1 shows the plots of these results. Although exploitative results of the dataset A show much higher score than ones of the dataset B, exploratory results of both datasets are almost same. Just in case, using the paired t-test to compare exploitative results of the dataset A with the one of the dataset B, we find that the difference is significant at the .01 level ($t(29)=3.762$). In contrast, there is no statistically difference of exploratory results between the dataset A and B ($t(29)=-0.548$, n.s.).

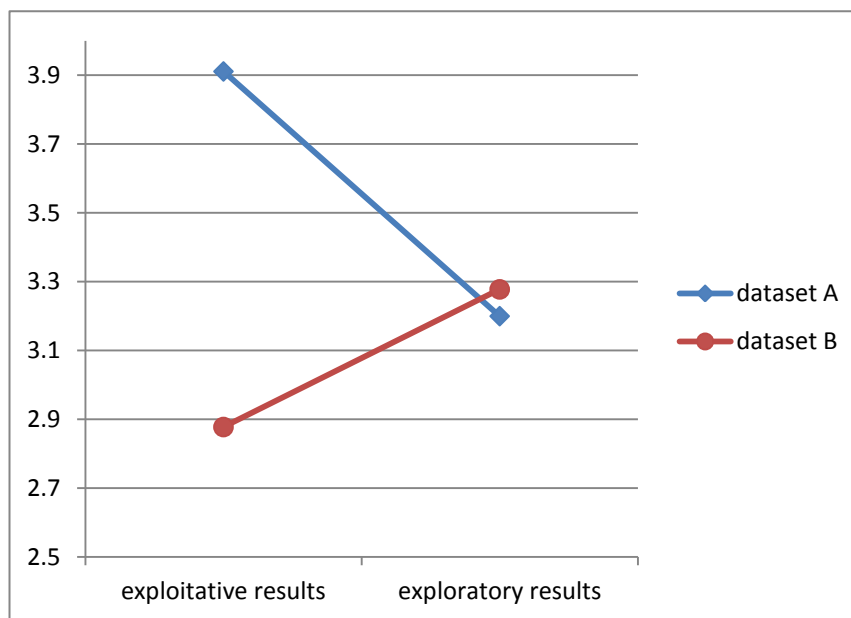


Figure 1 The difference of dataset characteristics

From these results, we consider that the dataset A can be regarded as the data about ambidextrous organization, because it shows both high profitability and exploratory results simultaneously. On the other hand, the dataset B is considered as the data on just innovation which does not lead profit at least in the short term. The dataset B showed the same level of exploratory results as the one of the dataset A, although its exploitative results are quite low. When we used the paired t-test about the relationship between the difference of results and resource allocation, we could not find significant results statistically ($t(29)=0.782$, n.s.). It means that the hypothesis 1 is not supported.

In the following analyses, we use dataset A to figure out the mechanism of organizational learning in terms of resource allocation, because it is regarded as the data on the ambidextrous organization.

Table 1 Spearman's rank correlations

	1	2	3	4	5	6	7	8	9	10	11
1. exploitative results											
2. exploratory results	0.025										
3. enough RA	0.415*	-0.214									
4. accumulated OC	0.353*	-0.192	0.408*								
5. improved equipment	-0.210	-0.320+	0.171	0.250							
6. patents	-0.006	0.233	0.080	0.174	0.089						
7. teamwork	-0.034	-0.054	0.228	0.008	0.444**	0.451**					
8. interactions	-0.061	0.145	0.140	0.164	0.222	0.064	0.323+				
9. accumulated IC	0.168	0.387*	-0.126	0.056	-0.320+	0.015	-0.252	0.101			
10. Index of LI	0.139	0.281	-0.110	0.192	-0.152	0.084	-0.187	-0.006	0.044		
11. technology outside	0.020	0.460**	0.016	0.018	-0.110	0.313+	0.037	0.111	0.038	0.219	
12. information outside	0.025	0.193	-0.057	0.275	0.317+	0.782***	0.299+	0.010	0.161	0.111	0.252

N=36, ***p<0.001, **p<0.01, *p<0.05, +p<0.1

Tests of hypotheses

Spearman's rank correlation matrix for all variables was presented in Table 1. We can easily find that *enough resource allocation* has a positive correlation with *exploitative results* ($r=0.415$, $p<0.01$), but that it has no relation with *exploratory results* ($r=-0.214$, n. s.). It means that hypothesis 2a is supported but hypothesis 2b is not supported.

The next point to look is the relationship between two kinds of results and multilevel of resource allocation. At the organizational and group level, of five independent variables, only *accumulated organizational capability* has significant correlation with *exploitative results* ($r=0.0353$, $p<0.01$). Hypothesis 3a is thus partly supported. In contrast, *accumulated organizational capability* does not show strong correlation with *exploratory results*. Actually, it shows weakly negative relation ($r=-0.214$, n.s.). Only *improved equipment* has a weak relationship with *exploratory results*, which is negative ($r=-0.320$, $p<0.1$). Considered these results, hypothesis 3b is not supported.

The only variable which has clear positive relation with exploratory results is the *accumulated individual capability* ($r=0.387$, $p<0.01$). Therefore, hypothesis 3c is supported. Of the two variables about external resources, *cutting-edge technology in industry* also has a positive correlation with *exploratory results* ($r=0.460$, $p<0.001$). However, there is no significant correlation between *cutting-edge technology* and exploitative results. As a result, hypothesis 4 is supported.

Table 2 Regression Analyses for exploitative and exploratory results

Variable	exploitative results			exploratory results		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
enough RA	0.406*			-0.191		
accumulated OC		0.453*	0.447*		-0.317*	-0.276+
improved equipment		-0.339	-0.451		-0.140	-0.058
patents		-0.193	-0.421		0.224	0.226
teamwork		0.302	0.333		0.065	0.083
interactions		-0.114	-0.093		0.189	0.111
accumulated IC		0.014	-0.043		0.352*	0.380*
Index of LI		0.143	0.115		0.352*	0.315*
technology outside information outside			0.011			0.309*
			0.281			-0.143
F	6.730*	1.260	1.023	1.287	3.652**	3.576**
R ²	0.165	0.240	0.261	0.036	0.477	0.553
Adjusted R ²	0.141	0.049	0.006	0.008	0.347	0.398

N=36, ***p<0.001, **p<0.01, *p<0.05, +p<0.1

Table 2 shows the results of regression analysis for exploitative results and exploratory results, respectively. In this article, three models for each are presented. At Model 1, we entered the variables about enough resource allocation. As shown in Table 2, enough resource allocation has a significant relationship with exploitative results, but no relationship with exploratory results. Although the former relation is positive, the latter is negative. We can get the same results as Spearman's rank correlation matrix, that is, hypothesis 2a is supported, but hypothesis 2b is not supported.

Model 2 for exploitative results and exploratory results focuses on effects the multilevel of resource allocation on dependent variables. Of three factors at organizational level, only *accumulated organizational capability* has a positive significant relation with exploitative results. Rather, the others at organizational level have a negative impact on exploitative results. On the other hand, exploratory results have significant correlation with two individual variables and *accumulated organizational capability*: former has a positive and latter has a negative effect. From these results, while hypothesis 3a and hypothesis 3c are supported, hypothesis 3b is not supported. Rather, we get an opposite results of our hypothesis.

Model 3 examined the effects of utilizing external resources on exploitative and exploratory results. We can find a positive relation only between *cutting-edge*

technology in industry and exploratory results. That is, hypothesis 4 is supported. Figure 2 shows all these results.

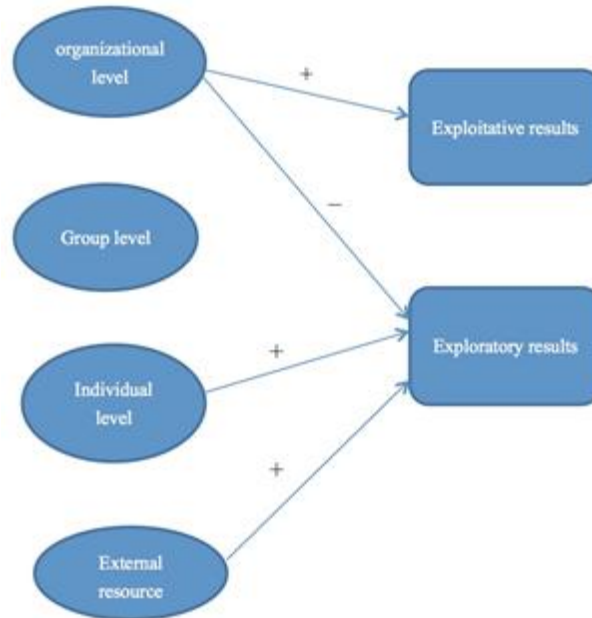


Figure 2 Resource allocation for organizational ambidexterity

DISCUSSION AND CONCLUSION

Recently, the interest in organizational ambidexterity grows up. For survival and success in the long term, organizations need to balance two contradictory processes and manage the exploitation-exploration tension. However, little is known about how and what kinds of resource allocation enable organizations to realize the ideal condition.

In order to investigate the mechanisms, we did questionnaire survey targeted at employees belonging to one of the ambidextrous firms, and analyzed the data statistically.

At first, we assumed that ambidextrous organization required much more resource allocation than innovation without profitability, because some previous studies explained that organizations allocated the most of its resources to the innovation which had been legitimized. In fact, however, there is no significant difference between them.

Secondly, we examined the relationship between the quantity of resource allocation and two kinds of results, exploitative results and exploratory results, by using the dataset on organizational ambidexterity. The conclusion is that the more organizational resources are allocated to exploitative processes, the more organizations achieve high profitability. However, there is no significant relation between the quantity of resource allocation and exploratory results.

When we apply the multilevel approach of Crossan et al. (1999), we get more interesting findings. While resource allocation at organizational level, i.e. accumulated organizational capability, organizational know-how and the patents that organizations hold, is useful to achieve high profitability, it has negative impacts on exploratory results as like creating new idea and new domain. Instead, resource allocation at individual level, i.e. accumulated individual capability and active learning by individual, has positive impacts on exploratory results. In a narrow sense, accumulated individual capability and active individual learning should not be included with organizational resources. In that case, there is the possibility that ambidextrous organizations are realized when organizational resources are mainly allocated to not exploratory process but exploitative process of organizational learning. We consider that such resource allocation enables ambidextrous organizations to manage the exploitation-exploration tensions.

Finally, we can find that utilizing external resources has positive relationship with exploratory results. The external resources, such as cutting-edge technology in industry, play an important role to cover the shortfall of internal resources allocated to exploratory process. At the same time, they also play a role to keep divergence needed for generating exploratory results. When the organization continues to depend on only internal resources, diversity will decrease gradually. As a result, to generate new idea and innovation will be difficult.

In this article, we picked up only one company as a target of investigation. The number of respondents of our survey is quite small. Therefore, the findings we showed here are very limited. In order to obtain a robust answer, we need to continue and accumulate similar researches in the future.

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