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**Resource Slack, Innovation Ambidexterity, and  
Quality Performance: Knowledge Heterogeneity  
Perspective**

By Fu-Sheng TSAI <sup>a†</sup> Che-Hung LIN <sup>b</sup>  
& Kou-Cheng CHUNG <sup>c</sup>

**Abstract.** Resource slack and innovation ambidexterity can both be represented and connected conceptually with heterogeneous knowledge structure. Hypothesizing with the logic of knowledge heterogeneity, the present study empirically examined ambidexterity's mediation effect in the relationship between two forms of resource slacks (i.e., human and financial resources) and product quality. Companies in Taiwanese manufacturing industry were located based on the random inspection conducted by the Department of Budget, Accounting and Statistics of the Government in 2011, and surveyed. Our findings demonstrated that slack resource is only an indirect factor for product quality evaluated by internal developers and producers (i.e. development and delivery processes) and external customers (product-specific quality). Specifically, first, different resource slacks influence differently on ambidexterity; second, both exploration and exploitation positively influence quality of innovation; third, ambidexterity plays a significant mediator's role that may strategically alter the relationship between slack and quality. Research has paid increasing attention to ambidexterity (i.e., exploration and exploitation) in organizational innovation. Mostly, however, focus on the influencing factors leading to possible ambidextrous design or implementation of innovation. Few have examined ambidexterity's effects on specific dimensions of innovation as outcomes.

**Keywords.** Resource slacks, Ambidexterity, Quality, Knowledge heterogeneity.

**JEL.** M10; M11; M14.

## 1. Introduction

Organizations operate in an open system and need to be able to adapt to the environment for survival and maintaining long-term development (Ferrary, 2011). Lee *et al.* (2013) have noted that incorporation of external, new

<sup>a</sup> Cheng Shiu University, Department of Tourism & Recreation and Office of Institutional Research & Management, No. 840, Chengcing Rd., Niasong District, Kaohsiung city (833), Taiwan.

☎. 886-7-7310606 ext. 5132

✉. fusheng\_tsai@hotmail.com

<sup>b</sup> Cheng Shiu University, Department of Information Management, Kaohsiung, Taiwan.

☎. 886-7-73100606 ext. 5318

✉. linch@gcloud.csu.edu.tw

<sup>c</sup> National Penghu University of Science and Technology, Department of Business Administration, Taiwan.

☎. 06-926-4115 # 3902

✉. d9732004@gmail.com

capabilities and knowledge for innovation has become the key in an innovation system where multiple part engagement is critical. Under such circumstances, research and practices have revealed that management of innovation, both in exploratory and exploitative fashions, increases vitality of organizations during such a transitional business age (Ferrary, 2011; Lin, *et al.* 2013; O'Reilly & Tushman, 2008; Tushman & Smith, 2002; Tushman & Anderson, 2004). Heavy investment in exploratory activities for innovation may generate dramatic new advantages or disrupt existing disadvantageous; meanwhile, investments in exploitative innovation ensure higher certainty of success by utilizing existing resource bases. Moreover, increasing cross-disciplinary collaborations (e.g., Tsai & Hsu, 2012) explicates the need for companies to maintain multiple modes of innovation in significant affairs such as R&D and others.

To maintain the co-existence or balance of exploration and exploitation in innovation, however, companies encounter challenges and tensions, especially under the circumstance of resources limitation (Andriopoulos & Lewis, 2008; Cheng & Kesner, 1997; Voss, Sirdeshmukh & Voss, 2008). Pursue of such co-existence or balance, which has been increasingly and formally termed as ambidexterity (see reviews in Lavie, Stettner & Tushman, 2010; Raisch & Birkinshaw, 2008; Simsel, 2009), may be risky and contingent itself (Greve, 2007; March, 1991). As March (1991) commented, organizational adaptive actions, "... by refining exploitation more rapidly than exploration, are likely to become effective in the short run but self-destructive in the long run (p.71)." Lin *et al.* (2013) also argued that exploitation-oriented innovation strongly leads to paradigmatic changes in the field of telecommunication industry.

Rather than choosing between sides of either being exploratory or exploitative, companies have to face competitive pressures by developing a dynamic capability that maintains both exploratory and exploitative activities, in order to predict and respond to uncertainty and dynamics surrounding ongoing innovation (O'Reilly & Tushman, 2008). This is especially true in industries of Asian countries. While some may assert that companies should reduce their innovation commitment (e.g., R&D expenses) when facing environmental turbulence, more have suggested searching for possible balances between investments in exploitation *and* exploration efforts given both models' discrepant importance (He & Wong, 2004; Raisch, *et al.* 2009). For example in Asian context, Lee *et al.* (2013) suggested both exploitation and exploration may benefit innovation outcomes in terms of product development. Literature has increasingly been advocating the necessity for companies to devote in the coexistence of exploration and exploitation to possess long-term organizational performance (March, 1991).

Following the above mentioned logic on managing ambidexterity with resource consideration, resource slack (George, 2005; March & Simon, 1958) as organizations' realized or potential excess capacity in adapting to internal or external environmental challenges (Cyert & March, 1963; 1992; March, 1991; Nohria & Gulati, 1996; Voss, Sirdeshmukh & Voss, 2008), constitutes a potential base and contextual determinant for building organizational dynamic capability in balancing exploitative and exploratory innovation (Cheng & Kesner, 1997). However, debates exist, again, regarding whether organizational slack itself can remain definite influences on explorative and/or exploitative organizing. One the one hand, the resource slack level determines whether the company has sufficient resources to buffer all the possible threats for ambidexterity (Moses, 1992; Nohria & Gulati, 1996). Some researchers believed that the existence of organizational slack can make organizations invest in radical innovations and prevent potential resource consumption of the organization (O'Brien, 2003). Sharfman *et al.* (1988) indicated that organizational slack has the effect of buffering fund operations.

Imperceptibly, organizational slack urges the company to have an organizational culture that encourages trying new things to further work on multiple angles in uncertainty. Thus, organizational slack and diverse explorative activities have a positive relationship. These explorative activities include innovation (Nohria & Gulati, 1996), risk tolerance (Singh, 1986) and organizational adaptation (Kraatz & Zajac, 2001). On the other hand, however, researchers support the idea that the existence of organizational slack leads to risk aversion and cautious decisions-making which causes the reduction of explorative activities (Mishina, Pollock & Porag, 2004) and increase in incremental adjustments or exploitative activities (Tan, 2003).

Hence, resource slack may facilitate managing ambidexterity but its current effectiveness is indefinite and contingent. To relax this puzzle, we argue for the need to distinguish between differentiated effects from different forms of resource slacks. The effects of resources slack on organizational innovation are contingent upon firms' strategic actions. For example, Cheng & Kesner (1997) found that the relationship between slack resources and organizational responses to environmental shifts is contingent upon companies' resource allocation patterns. In such vein, George (2005) confirmed the necessity for combining behavioral and resource constraints in explaining the slack-performance relationship. Mishina et al. (2004) noted that the effects of innovation in product versus market boundaries can be altered by different levels of financial and human resources slack.

To sum up, the present study set to research on the influences of differentiated forms of resource slack on organizational ambidexterity, and links such influences onto quality as a critical organizational consequence. Internal (production) and external (product) quality are both critical in constituting a successful product-based innovation and should be equally evaluated (Cowherd & Levine, 1992). While resource slack has been investigated for predicting important organizational consequences, such as general performance, resource allocation, product innovation or market expansion, etc. Mishina, Pollock & Porac, (2004), organizational learning (whether exploitative or exploratory) also has its own functionality on organizational consequences have considered both of resource slack and ambidexterity's joint impacts on the internal an (He & Wong, 2004; O'Reilly & Tushman, 2008; Raisch, et al. 2009; March, 1991). However, few d dexternal quality for new and key products. Thus, as Lecuona & Reitzig (2014) implicated that the true effect of resources slack on firm performance relies on the portfolio and leverage of the slack resources accumulated, we argue for an important mediator (ambidexterity) that leverages the slacked resource onto effects for quality.

## 2. Literature Review

### 2.1. *Ambidextrous Innovation*

Past studies indicate that organizations should devote on both of the explorative and exploitative learning, hoping to obtain a good organizational performance (March, 1991). Explorative activities create new innovative competitive advantage while exploitative activities improve the existing competitive advantage to create its value. Some researchers believed that knowledge, organizational learning, and improvement is the core of exploration and exploitation (e.g., Baum, Li, & Usher, 2000; Benner & Tushman, 2003; He & Wong, 2004). Mostly agreed, is that knowledge constitutes an important base for superior managerial and innovation performances (Orsi, 2006; Sordi & Azevedo, 2008), whether in local or international business contexts (Ribeiro & Oliveira, 2009). Other studies believed that all the activities pertaining to learning and innovation are considered

exploration while the core goal of exploitative activities is applying old existing knowledge and not any kind of learning trajectory. Rosenkopf & Nerkar (2001) focused on the innovation process of R&D and patent generation as organizational exploration. Exploration and exploitation have different significance in the consequences of organizational learning activities.

However, past researches showed inconsistent conclusions on the relationship of the ambidexterity and performance of R&D. A solution to such tension is to pursue balance between exploration and exploitation, which is affected by the factors such as cost, profit and ecological interaction. Baum, Li, & Usher (2000) believed that exploration is to obtain interests through a consistent change in process and planned experiment and action. On the other hand, exploitation is the interest gained through the link of searching, experiencing, and re-applying existing technology. Benner & Tushman (2002) indicated that exploration is the transformation of an organization to a different technological trajectory, while exploitation is improving through an existing technological trajectory. Vermeulen & Barkema (2001) defined exploration as searching for new knowledge while exploitation as the continuous application of existing technology. According to He & Wong (2004), the technological innovation purpose of exploration is to enter a new product market while the technological innovation purpose of exploitation is to improve the existing product market – both are important.

### 2.2 Resource Slack

Organizational source slack plays a decisive role on the company's strategies of improving or creating new markets (Hambrick & Snow, 1977; March, 1991). In the past, the focus of the organizational slack was on the effect of organizational slack on the company's skills and organizational performance. Past researchers believed that organizational slack is the element to explain an organization's innovation behaviors (Bourgeois, 1981; Levinthal & March, 1981; Damanpour, 1987). Organizational slack can work on innovation projects under the uncertainty of the success factor of the project and encouraged risks (Bourgeois, 1981). Organizational slack can also test a new strategy according to the many risks of the company such as new products or entering a new market (Hambrick & Snow, 1977; Moses, 1992). The resource slack can accelerate innovation where the promotion of slack resource is considered to be a more potential innovation project (Levinthal & March, 1981).

After March (1991) proposed the articles on exploration and exploitation, it already triggered extensive discussions and attention in the fields of technological innovation, organizational design, organizational fit, organizational learning, competitive advantage and organizational survival (Benner & Tushm, 2003; Burgelman, 2002; Holmqvist, 2004; Katila & Ahuja, 2002; McGrath, 2001; Siggelkow & Levinthal, 2003). March (1991) defined exploration and exploitation as main utilities to improve organizational performance and enhance competitiveness through learning, analysis, simulation, reconstruction and technological change. Cyert & March (1963) proposed organizational slack as the difference between the resources obtained by the organization and the needed resources to maintain its operations. Recently, Voss, Sirdeshmukh & Voss (2008) provided real-life examples of absorbed and unabsorbed resource (p.149). Others believed that the existence of organizational slack could lead to risk aversion, cautious decisions-making and reduction of explorative activities of organizations (Mishina, Pollock, & Porac, 2004).

Cyert & March (1963) explain the concept of resource slack and classified it into two types, namely, unabsorbed slack and absorbed slack. Unabsorbed slack are liquid resources that are not appointed yet. For example, existing funds and financing facilities are temporary but resources that are being used can rapidly

improve productivity or obtain other management objectives. Absorbed slack are appointed resources and has the mission role to complete a task and the organization's most efficient cost of resource utilization such as surplus capital or hiring excess human resources.

Bourgeois & Singh (1983) developed a set of integrated standards to measure quantity using financial viewpoints as basis called source slack where the level of easy-of-recovery of source slack is divided into three types, available slack, recovery slack and potential slack. Available slack are the resources in the technical design that has not been absorbed by the organization. This type of organizational slack mainly measures unused but can be rapidly obtained resources such as liquid funds. Recovery slack refers to the resources that are already assigned but can still restore its slack nature, for example, the value of the facilities of a factory if sold. Potential slack refers to the ability of the organization to obtain additional resources from the environment such as the ability of financing capital. More recently, Voss, Sirdeshmukh & Voss (2008) conducted the research on the resource slack and product exploitation/exploration relationship. They provided persuasive evidence that both financial and human resources slack may affect product exploitation and exploration.

Financial resource slack is considered the lowest absorbed source slack and the easiest source slack to be configured (Greve, 2003). Because financial resource slack is not rare and not absorbed, organizations can't limit the reconfiguration of the financial resource slack and thus, organizations seldom request to preserve financial resource slack (Voss, Sirdeshmukh & Voss, 2008). Furthermore, because explorative R&D can enhance the organization's long-term position, the organization often categorize financial resource slack as a risky explorative R&D. The unabsorbability of financial resource slack causes it to be easily used in the explorative R&D activities. Due to this reason, many researchers believed that high financial resource slack has positive relationships with product exploration (Mishina, Pollock & Porac, 2004; Nohria & Gulati, 1996; Tan & Peng, 2003). Thus, hypothesis 1a is proposed.

*Hypothesis 1a: Financial resource slack and explorative R&D has a positive relationship.*

When the financial resource slack of the organization is few, the organization will probably turn to the competitiveness of the existing product utilizing the minimum improvement to obtain the difference of the products (Levinthal & March, 1981). Low financial resource slack is still sufficient to implement exploitative R&D activities utilizing suitable investment to obtain expected return. However, following the increase of the financial resource slack, the expected return produced by the exploitative R&D activities no longer attracts investments. When the organization possesses more financial resource slack, it tends to invest lesser resources into exploitative R&D activities (Voss, Sirdeshmukh & Voss, 2008). Thus, hypothesis 1b is proposed.

*Hypothesis 1b: Financial resource slack and exploitative R&D has a positive relationship.*

Human resource slack is believed to be the resource slack among professional technicians and it is considered as rare and absorbed (Mishina, Pollock, & Porac, 2004). Thus, human resource is seldom used in the reconfiguration of explorative R&D (Voss, Sirdeshmukh & Voss, 2008). Besides, the human resource slack of the organization is hard to be transferred (Mishina, Pollock & Porac, 2004). Therefore, considering the rareness and absorbability of the human resource slack, it has a negative relationship with explorative R&D. Thus, hypothesis 2a is proposed.

*Hypothesis 2a: Human resource slack and explorative R&D has a negative relationship.*

Generally, many believed that human resource is used to develop an existing routine work like when most of the human resources are employed in the R&D of existing products and the technology is already controlled. The absorbability of the human resource itself makes it hard to reconfigure in a short period of time (Voss, Sirdeshmukh & Voss, 2008). In addition, because when human resource wants to transfer, it will have difficulties in the administration of the organization's structure (Mishina, Pollock & Porac, 2004). Therefore, organizations that possess human resource slack would have the tendency to work on exploitative R&D. Thus, hypothesis 2b is proposed.

*Hypothesis 2b: Human resource slack and exploitative R&D has a positive relationship.*

### 2.3. Ambidexterity

Exploration is a learning system possessing a new and different alternative plan and experiment goal (March, 1991). In a dynamic environment, R&D activities such as research, variance, risk tolerance, discovery and innovation could occur (Sinkula, Baker & Noordewier, 1997; Slater & Narver, 1995). These activities could implement a breakthrough concept in exploring technology and resources, testing customer needs and not accepting the current needs of the customers.

Explorative innovation is quite important in promoting the quality of a product. Companies can promote their reliability by improving their internal process. According to Taguchi (1987), investing a lot of cost won't improve a company's quality but they should explore new process and new skills to improve productivity. Ahire & Drefus (2000) explained that the poor quality of a product will consume more of the company's resources. Thus, companies constantly develop new technologies to continuously improve the quality for the product standard to be more excellent than the other quality of this industry. After reaching an economic scale, the cost will decrease. Thus, hypothesis 3a is proposed.

*Hypothesis 3a: Explorative R&D positively affects internal quality.*

With regards to ambidextrous company strategy, the definition of explorative R&D in the external quality explains that the company can obtain the information of the customers through marketing techniques or strategies and identify customer profiles from the information to make decisions according to the interests of the customers. Therefore, companies can conduct interviews and surveys to understand the things that are important to consumers nowadays. Payne (2006) explained that companies would obtain customer information through sales promotion and would file the information of the potential customers to continuously send sales promotion information to the potential customers in the future to obtain their trust. According to the perspective of customer relationship management, companies can make use of on-the-job training to promote the service quality of their employees and improve their customer satisfaction through the improved service quality. Thus, hypothesis 3b is proposed.

*Hypothesis 3b: Explorative R&D positively affects external quality.*

### 2.4. Quality performance

Exploitation mainly modifies and extends existing skills and technologies. The main argument of exploitation is emphasizing that the company, through abundant commitment and assurance, has the ability to compete with their competitors using the majority of their main resources to tightly guard their existing position in the market. It emphasizes on the existing ability and setting of resources of the organization to implement similar high efficiency activities to obtain the emphasized operational efficiency (Porter, 1996).

Ahire & Drefus (2000) argued that continuously modifying the product's process according to the company and the external demands can improve

productivity. Ahire & Drefus (2000) explained that the company internally would synergize with other departments to reduce the length of the product's design period and add new product development processes. Through the cooperation with the other departments, the company can continuously improve the product design and to have a more flexible manufacturing process. Thus, hypothesis 4a is proposed.

*Hypothesis 4a: Exploitative R&D positively affects internal quality.*

From the overall quality management perspective, quality can be improved and cost can be reduced through the overall value. Baran, Galka & Strunk, (2008) discovered that the benefits obtained from retaining existing customer is far better than obtaining new customers. At present, many companies put their emphasis on retaining existing customers. They use relational database to analyze, classify and obtain customer profile from the customer information. From the angle of relationship marketing, through the customers and maintaining a good relationship with them can produce trust and commitment with the customers which would assist in promoting external quality. Thus, hypothesis 4b is proposed.

*Hypothesis 4b: Exploitative R&D positively affects external quality.*

### 3. Research Methodology

In choosing the samples, this study chose based on the random inspection conducted by the Department of Budget, Accounting and Statistics of the Government in 2011 which focused on the primary data of the manufacturing industry. The subjects are Taiwan's major manufacturing companies, which is appropriate for the research topic (He & Wong, 2004) and where the questionnaires were sent to them through the mail. This study distributed 500 questionnaires and 273 copies were returned having a total returned rate of 54.6%. Non-response bias has been examined and we found not potential for such concern.

This study conducted a descriptive analysis to further understand the respondents' distribution and sample structure. The results showed that there are more male respondents (58.2%) than female. As for educational attainment, majority are college graduates (52.7%) and the age distribution is about 31 to 40 years old having 36.3%.

There are 6 major constructs with 24 measuring items. The 6 constructs are financial resource slacks, human resource slacks, explorative R&D, exploitative R&D, internal quality and external quality. Operational definitions and measurement items were listed in the Appendix 2. We developed measurement items based on the theoretical discussions of existing studies including the Voss, Sirdeshmukh & Voss (2008) and the March (1991). While Voss, Sirdeshmukh & Voss (2008) used objective data to measure slack and March (1991) use simulation models to support his framework, we complemented their measures by including perceptual evaluations of knowledgeable persons in the practical industry context. We used the 7-point Likert scale. Table 1 shows the correlation coefficient of the present dimension among which, the correlation coefficient of the external quality and explorative R&D is higher and the correlation coefficient of human resource slack and financial resource slack is the lowest.

**Table 1.** Correlation Matrix

Dimensions	Mean	Standard deviation	1	2	3	4	5	6
Financial resource slack	5.11	0.68206	1					
Human resources slack	4.65	0.98590	0.02	1				
Exploration innovation	5.21	0.84746	0.76	0.10	1			
Exploitation innovation	5.21	0.99334	0.74	0.17	0.61	1		
Internal quality	5.11	1.02015	0.60	0.04	0.58	0.67	1	
External quality	4.92	0.93781	0.68	0.14	0.70	0.79	0.66	1

This study conducted a test on the data of the research sample where Harman's one-factor test was adopted for all questions to undergo exploratory factor analysis (EFA). The results showed that 6 factors can be extracted and the explanatory power of the first factor is 40.182% which is less than 50%. This proves that the sample have no serious CMV. Furthermore, confirmatory factor analysis (CFA) was conducted to the 24 items to be included in the single factor test. The results showed that the factor loading of 19 items were greater than the standard value of 0.5 but not all items have a factor loading of equal or more than 0.5. The model value of the CFA (chi-squared value=467.3, DF=237, GFI=0.867, AGFI=0.832, IFI=0.947, CFI=0.947, RMR=0.063) and standard value(GFI > 0.9, AGFI > 0.9, IFI > 0.9, CFI > 0.9, RMR < 0.05) have not much of a difference after comparison. The CFA of the whole model shows the model value (GFI = 0.894, AGFI = 0.869, CFI = 0.913, NFI = 0.894 and RMR = 0.023). The results proved that the constructs are correlated and not all are from CMV.

#### 4. Results

Following the suggestion of Anderson & Gerbin (1988), this study conducted the two-stage structural equation models (SEM) analysis: (1) For the first stage, CFA and Cronbach's  $\alpha$  coefficient analysis was conducted to all the constructs and items by use of discriminant validity and reliability analysis to develop a stable measurement model. (2) For the 2<sup>nd</sup> stage, the multiple items were reduced to fewer indices. In the discriminant validity, this study adopted the discriminant validity evaluation method proposed by Fornell and Larcker. Its method is to check the average variances extracted (AVE) of the latent variables. If the AVE is greater than the correlation coefficient square value among pair variables, this proves that discriminant validity exists among latent variables. The results of this analysis, as shown in Table 2, have good discriminant validity.

CFA results is also shown in Table 2. The Cronbach's  $\alpha$  of financial resource slack, human resource slack, explorative R&D, exploitative R&D, internal quality and external quality are 0.717, 0.808, 0.856, 0.937, 0.877 and 0.795, respectively. All the values exceed the 0.7 standard suggested by Nunnally (1978).

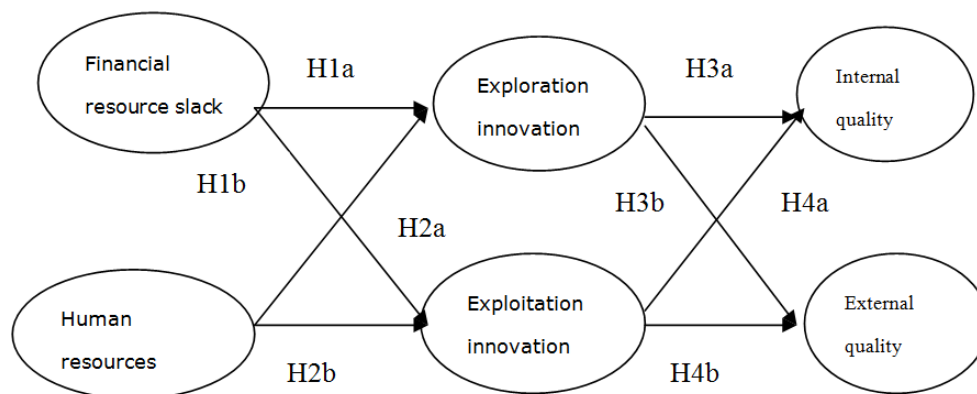
**Table 2.** Structural Model Analysis Results

Dimensions( $\alpha$ )	Standard factor loading( $\lambda$ )	Error( $\delta/\epsilon$ )	CR	AVE
Financial resource slack (0.717)			0.79	0.48
FR1	0.73	0.06		
FR 2	0.72	0.05		
FR 3	0.64	0.05		
FR 4	0.67	0.05		
Human resources slack (0.808)			0.82	0.60
HRS1	0.65	0.07		
HRS 2	0.83	0.06		
HRS 3	0.83	0.07		
Exploration innovation (0.856)			0.80	0.51
EOR1	0.80	0.07		
EOR 2	0.85	0.06		
EOR 3	0.68	0.06		



EOR 4	0.78	0.06		
Exploitation innovation (0.937)			0.88	0.65
EOI1	0.85	0.06		
EOI 2	0.68	0.07		
EOI 3	0.78	0.06		
EOI 4	0.88	0.06		
Internal quality(0.877)			0.93	0.71
IQ1	0.87	0.06		
IQ 2	0.89	0.06		
IQ 3	0.85	0.06		
IQ 4	0.84	0.06		
IQ 5	0.88	0.05		
External quality(0.795)			0.87	0.62
EQ1	0.83	0.07		
EQ 2	0.81	0.07		
EQ 3	0.83	0.07		
EQ 4	0.68	0.06		

In the theoretical model analysis, the goodness-of-fit index of the overall model are GFI = 0.894, AGFI = 0.869, CFI = 0.913, NFI = 0.894 and RMR = 0.023. Although these values did not obtain the ideal values but they are still within the acceptable range. The evaluation standards for measuring the fit of internal structure model are “the factor loading of all the observatory parameter should be significant”, the individual reliability of the observatory parameter should be greater than 0.5”, “ the reliability of potential variable combination should be greater than 0.6” and the AVE of potential variance should be greater than 0.5”. According to Kang, *et al.* (2005), the parameter indicates the reliability and validity of an item and the measurement range is from lowest to highest. The results of this analysis conform to the value suggested. Thus, the research framework proposed by this study is a better internal structure model (as shown in the Graph 1).



Graph 1. Paths Analysis of the Structural Equation Model

Table 3 shows that the hypothesis path of the relationship among financial resource slack, explorative R&D and exploitative R&D,  $\gamma_{11} = 0.86$  and  $\gamma_{12} = 0.81$ , respectively, showed significant standard. This represents that financial resource slack has significant positive effect on explorative R&D and exploitative R&D. Thus, the slacker the financial status of the company, the more supportive they are of explorative R&D and exploitative R&D which would help improve the product quality more.

**Table 3.** Paths Analysis of Research

Hypothesis		Path	Standard $\beta$ (t)	Supported or not
H1	$\gamma_{11}$	Financial resource slack →Exploration innovation	0.86(10.196)	Support
H2	$\gamma_{12}$	Financial resource slack →Exploration innovation	0.81(10.701)	Support
H3	$\gamma_{13}$	Human resources slack →Exploitation innovation	0.10(2.266)	Support
H4	$\gamma_{14}$	Human resources slack →Exploitation innovation	0.14(2.945)	Support
H5	$\beta_{21}$	Exploration innovation →Internal quality	0.31(4.372)	Support
H6	$\beta_{22}$	Exploration innovation →External quality	0.39(6.386)	Support
H7	$\beta_{23}$	Exploitation innovation →Internal quality	0.59(8.186)	Support
H8	$\beta_{24}$	Exploitation innovation →External quality	0.60(10.205)	Support

In the relationship of human resource slack, explorative R&D and exploitative R&D, the hypothesis paths are  $\gamma_{21} = 0.10$  and  $\gamma_{22} = 0.14$ , respectively. This means that human resource slack has significant positive effect on explorative R&D and exploitative R&D. The increase of the company's human resource proves to have a significant difference on its relationship with explorative R&D and exploitative R&D. However, it has a weaker relation compared to financial resource slack.

Explorative R&D has a significant effect on the internal and external quality. The internal and external quality of the company improve when it works on explorative R&D. Thus, hypothesis H5 and H6 are supported. Exploitative R&D also has significant effect on the internal and external quality. Thus, the internal and external quality of the company also improve when it works on exploitative R&D. When the company modifies its product to conform to the mass market, the company is also considering the needs of the consumers at the same time. Thus, modifying the product and/or service itself can promote internal and external quality. Hypothesis H7 and hypothesis H8 are supported.

## 5. Discussions & Conclusion

This study aims to examine ambidexterity's mediation effect on the relationship between two forms of resource slacks (human resources and financial slack) and product quality. By doing this, the author(s) hope to fill up the gap that most studies focused on the influencing factors leading to possible ambidextrous design or implementation of innovation without examining ambidexterity's effects on specific dimensions of innovation as outcomes. The co-existence of exploitation and exploration innovation is treated as organizational ambidexterity. That is, firms with greater organizational/innovation ambidexterity possess better abilities to develop exploitative and exploratory innovation at the same time. Thus, in the extant literature, the conceptualization of organizational/innovation ambidexterity is viewed as a uni-dimensional construct (Lin *et al.* 2013; He & Wong, 2004). Even though different studies have different ways to measure ambidexterity, they focus on the joint effect of exploitative and exploratory innovation instead of centering on their individual impact of the above two innovations. Surely, another stream of research focuses on different implications of exploitation and exploration in the context of innovation (Yalcinkaya, Calantone & Griffith, 2007). These two research streams are relevant but quite different, providing different theoretical

value and implications. The present work demonstrated a small progress in bringing the two research streams together.

Research and development (R&D) is quite important to the competitiveness of a company. However, it is quite difficult to put high-risk, exploratory resources on R&D during recession. Past research on the inter-relationships among slack, ambidexterity and quality performance was little. Especially, there have been relatively few studies setting to further integrate the examination for the possible antecedent and consequent factors of ambidexterity (He & Wong, 2004; Yalcinkaya, Calantone & Griffith, 2007). Extending Voss, Sirdeshmukh & Voss (2008) the results here demonstrated that the effect of the rare and un-absorbed human resource slack and the low-rareness and low-unabsorbed financial resource slack on ambidexterity as antecedent factor influence ambidexterity heavily. This study also examined the consequent quality performance variation, by showing that ambidexterity is an important mediator that transforms the effects of resource slack into quality performance.

Specifically, financial resource slack as unabsorbed resource has a positive effect on exploitative R&D, which is opposite but complementary to the result of Voss, Sirdeshmukh & Voss (2008). Unabsorbed slack resource is considered as an unauthorized liquid resource. The highly uncertain R&D activities are operational activities that needs risk tolerance. In Taiwan, although the manufacturing companies have a great amount of capital, investment decision in high-risk R&D activities is conservative – firms tend to rather invest in better manufacturing process and adding novel facilities. This shows that financial resource slack can make an organization's innovation direction to exploitative R&D strategy. Singh (1986) indicated that unabsorbed organizational slack and risk tolerance have no certain relationship but this type of slack can rapidly promote productivity. Connecting the results presented here and that from Voss, Sirdeshmukh & Voss (2008) we propose the needs for further studies of resource slack's effect on exploitative-exploratory orientation across different industries, as well as the role of risk perception in such relationship.

Moreover, this study showed that human resource slack influences quality performance through both exploitative and exploratory innovation. Scholars believed the contradiction does not exist between explorative and exploitative activities (Gupta, Smit & Shalley, 2006). Voss, Sirdeshmukh & Voss (2008) argued that the measured level of human resource slack is categorized as absorbed resources that can't be retained in a department, such that staff of the finance department can't be transferred to the R&D department. However, the research sample of Voss was only limited to the R&D department and the HR slack of the other departments was not understood. This study complement previous study and explained that when the human resource exceed the regular need, the organization has the ability to undergo ambidextrous innovation and eventually leave positive impact on quality performance.

Practically, this study successfully illustrates the dynamics among resource bases, strategic actions and quality, the relationships that has not been conclusive in extant studies (Barney, 1991). We suggest that when the goal of the organization is to have a good quality performance, the innovation strategies of companies in the manufacturing industry should apply an ambidexterity strategy, under the conditions of resource slacks.

## 6. Limitation

Limitation of this study notes opportunities for potential future studies. First, we collected cross-sectional data set to provide an exploratory demonstration of the

proposed inter-relationships among major constructs. Our results and analyses could not demonstrate longitudinal dynamics, however, in an empirical fashion. Future research can commit in observing the conceptual and empirical model in the present study at multiple time points to see if there is consistency or variation over time. Our study focus on manufacturing industry, which limits the generalizability of our core arguments. Nevertheless, our results and discussions can still provide policy and managerial implications, because manufacturing industry is one of the cornerstone for Economy in many developing countries. We conduct the empirical study in one of the representative innovative countries in Asia (i.e., Taiwan). However, contextual differences may constrain the applicability of the results to other (also innovative) countries. Further replication or extension may strengthen the theory model proposed here.

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