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Abstract: Many start-ups end up with the failure because they are unable to establish the effective business model. We use the organizational learning theory and network theory to study the mechanism of business model innovation for start-ups. Based on the 256 data of start-ups, the results of PLS structural equation model analysis show that both acquisitive learning and experimental learning can significantly promote the business model innovation. The formal network and informal network play different moderating roles on the relation of organizational learning and business model innovation.

Keywords: Business Model Innovation, Acquisitive Learning, Experimental Learning, Formal Network, Informal Network

1. INTRODUCTION

The Entrepreneurship is the important power to promote social and economic development. However, the average life expectancy of start-ups in China is only 2.5 years. Innovation is considered as the fundamental driver of firm growth in the changing environment. For start-ups, it may be difficult to establish the advantage by technology innovation and product innovation due to their short resources. Whereas business model innovation(BMI) can help companies quickly build competitive advantage by new value propositions, introducing new trading partners, and reshaping trading mechanisms to meet the diverse customers needs[1].Some start-ups focused on BMI have made great progress. For instance, Netease Cloud Music creates a new business model of "social music", which overturns the traditional model and quickly obtains customers without significant technical innovation. Literature on BMI mainly emphasize on the drivers (technology, market and so on), but pay less attentions to the facilitators such as leadership, organizational learning, and experiments. BMI is the dynamical evolution process[2], where organizational learning(OL) is the important facilitator to drive BMI, especially for start-ups. Zahra(1999)[3] divided OL into acquisitive learning(AL) and experimental learning(EL). Although more studies highlight the importance of OL on BMI[4], the social networks activities are ignored. Scholars in field of network theory indicate organizations are interrelated, where the network relations would influence resource acquisition, risk perception, and decision-making[5]. In China, enterprise growth is closely related to their network resources. Therefore, we will examine the issue that how to perform BMI for start-ups based on organizational learning theory and network theory.

2. LITERATURE REVIEW AND HYPOTHESIS

2.1 Business model innovation

Business model comes to be prevalent with the advent of the Internet in mid-1990s. Zott and Amit (2012) note that value creation is the core of business model, and define BMI as the innovation on content, structure,

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and governance [1], which was widely used in research[6].We would also adopt this definition in this study. BMI is especially critical for start-ups, which can capitalize their technologies and ideas, and help to find new market opportunities. Some scholars have analyzed the external factors such as technology[7], competition[8], and environment violence[9]and market risk [10] that drive BMI, which are mainly focused on the reactive innovation, with less attention to the initiative characters[11]. The business model reflects the perception of managers about value creation, acquisition, and delivery. Therefore, some scholars have recently studied BMI from the initiative perspective, and explored the roles of organizational experience, leadership, and organizational learning (OL) [12].

2.2 Organizational learning and business model innovation

OL refers to the development on insights, knowledge, and associations between past actions and future actions. According to Zahra et al.(1999), OL can be classified into acquisitive learning(AL) and experimental learning(EL). EL occurs inside the organizations, where the new and distinctive knowledge is created. AL occurs when a firm acquires and internalizes the knowledge outside the organizational boundaries. BMI is related to the process of creating and using new knowledge, which is associated with OL. Some research have suggested OL would give rise to BMI[4]. Specifically, AL is associated to integrate and utilize the existing knowledge. As for start-ups, the gradual knowledge accumulation is necessary for BMI. The knowledge serves as an important source of BMI, and their weak resources and capabilities require the acquisition and utilization of the knowledge outside the organizations to make up for their short resources. Entrepreneurs generally constantly envision their ideas, and EL is a process of creating new knowledge based on "trial and error" and "learning by doing", which is conducive to value creation for BMI[13].Therefore, the following hypotheses are proposed :

H1: AL is positively related to BMI for start-ups.

H2: EL is positively related to BMI for start-ups.

BMI requires not only the acquisition of external knowledge, but also the processing and creation of knowledge. The new knowledge obtained by AL helps start-ups to develop new products quickly. However, it will be difficult to utilize the external knowledge to establish the competitive advantages without the EL to integrate and absorb the new knowledge[13][6]. Based on the perspective of knowledge value chain, knowledge capture and knowledge creation play different roles in different stages of BMI, and AL usually precedes EL for start-ups, that is, AL affects BMI through EL. Therefore, the following hypotheses are proposed :

H3: EL plays a significant mediating role in the relationship between AL and BMI.

2.3 Moderating role of network

The entrepreneurs are embedded in social networks, which would be inevitably affected by their network relationships. Social network theory argues that network can help entrepreneurs to obtain the knowledge resources. For start-ups, the network relationships is even more important, which is inextricably associated to their development. According to Birley(1985)[14], the entrepreneurial networks can be classified into formal network(FN) and informal network(IFN). FN generally exist in the form of contracts, with clear responsibilities and rights among members[15]. Some studies indicated that entrepreneurs with good use of FN can escalate the enterprise growth[17]. FN is considered as weak links that can provide rich, free information with lower cost than strong relationships[15].The rich knowledge captured from FN to foster OL is vital for BMI [4]. So start-ups with more FN can strengthen the effect of OL to BMI. Therefore, the following hypotheses are proposed:

H4: FN enhances the positive effect of AL on BMI.

H5: FN enhances the positive effect of EL on BMI.

The IFN is generally based on the similar members, including entrepreneurial relatives, friends, colleagues and other individual relationship members[15]. In the initial stage, it is difficult to obtain enough resources due to their shortages, and the existence of IFN may help start-ups to obtain the key resources, especially the tacit knowledge (such as enterprises strategy, project experience), which in turn promote EL and reduces the risk of BMI[18]. In Chinese special relationship culture, companies are tended to trade and communicate with members in the INF. But the strong relationships in the IFN may easily generate redundant knowledge, and lack rich knowledge resources, thereby weakening the effect of AL, which is not conducive to BMI. So, the following hypotheses are proposed

H6: IFN enhances the positive effect of EL on BMI.

H7: IFN weakens the positive effect of AL on BMI.

3.   METHODOLOGY

3.1 Measurement development

To ensure the reliability and validity of the questionnaire, the scales utilized in this study are based on the existing maturity scales. Table 1 lists the definitions of the five constructs. According to Amit and Zott (2012), business model innovation can occur in three ways: content, structure and governance, which can be measured with six items. We divide the organizational learning into acquisitive learning and experimental learning according to Slater and Narver(1995)[16]. Based on Zhao, Li and Lee et al(2011)[13], the acquisitive learning is measured by five items and the experimental learning is measured by three items. According to Birley(1985)[14], the entrepreneurial networks could be categorized as formal network (for example: tax office) and informal network (for example: family and friends). In particular, based on John Watson's study (2007)[15], the formal network can be measured by five items, and the informal network can be measured by three items. All 22 items above are measured on the seven-point Likert scale. The respondents were asked to answer the questionnaires in the degrees from "completely inconsistent"(1) to "completely compliant"(7). The pre-test was conducted through the survey in 20 firms in a bid to ensure the statements can be understood without ambiguity and to collect suggestions about their design. Built on the trial filling, the questionnaire was revised, and then officially distributed widely.

Table 1.   Construct definitions and sources

Construct	Operational definitions	Source
Acquisitive Learning	Acquisitive learning occurs when a firm acquires preexisting knowledge existing outside its boundaries.	Slater (1995)
Experimental Learning	Experimental learning occurs internally when new knowledge is created that is distinct to that particular organization.	Slater (1995)
Formal Network	The formal network includes all the local, state, and Federal agencies, which are not usually in the business of diagnosing needs, but rather of satisfying them by responding to specific requests.	Birley (1985)
Informal Network	The informal network includes family, friends, previous colleagues, or previous employers, a group which whilst it may be less informed about the options and schemes open to the entrepreneur, is more likely to be willing to listen and to give advice.	Birley (1985)
Business Model Innovation	Innovate business model by redefining (a) content (adding new activities), (b) structure (linking activities differently), and (c) governance (changing parties that do the activities)	Amit and Zott (2012)

3.2 Data collection

This study seeks to understand the associations among organizational learning, entrepreneurial network and business model innovation. For this reason, questionnaires are distributed to the senior managements and CEOs of the new enterprises. The participants are told that this survey is conducted for the purpose of academical research and the information will be kept confidentiality. The 800 questionnaires have been distributed by the email to the respondents during March to June in 2018, after 3 rounds of data collections, 280 questionnaires were returned with 256 data valid, resulting the 35% response rate and 32% valid rate.

4. RERULTS

4.1 Common method bias

Harman's one-factor test was used to assess the common method bias(see Table 2), and the combined 5 constructs account for 72.639 percent of the total variance. The variance of each construct ranges from 4.48 to 35.84 percent, which are less than 50 percent. Therefore, the common method bias is excluded in this study.

Table 2. Total variance explained using harman's one-factor

Component	Initial Eigenvalues			Rotation sums of squared loadings		
	Total	variance	Cumulative variance	Total	Variance	Cumulative variance
1	6.810	35.844	35.844	3.443	18.120	18.120
2	3.246	17.085	52.929	3.431	18.060	36.180
3	1.566	8.244	61.173	2.909	15.309	51.489
4	1.327	6.986	68.159	2.825	14.869	66.358
5	0.851	4.480	72.639	1.193	6.281	72.639

4.2 Assessment of measurement model

Convergent and discriminant validity of measurement model are examined by factor loadings, CR, Cronbach's α and AVE(see Table 3). In particular, the factor loadings of all the 22 items are exceeding the 0.70 loading criterion. The CRs for all of the constructs range from 0.861 to 0.915, which also exceed the 0.70 recommended levels. The AVEs for the constructs range from 0.643 to 0.774, which exceed the 0.50 recommended levels. In addition, the squared root of the AVE of each construct is larger than its correlations(see Table 4) with other constructs. The Cronbach's α range from 0.773 to 0.887, which exceed the 0.7 recommended levels. Therefore, the convergent and discriminant validity are both confirmed.

Table 3.　Constructs reliability

Constructs	Sd	α	CR	AVE	$\sqrt{AVE}$
EL	1.291	0.854	0.911	0.774	0.880
AL	1.311	0.847	0.897	0.687	0.829
FN	1.338	0.773	0.861	0.676	0.822
IFN	1.319	0.813	0.889	0.727	0.853
BMI	1.073	0.887	0.915	0.643	0.802

Table 4. Inter-construct correlations

	EL	AL	FN	IFN	BMI
EL	**0.880**				
AL	0.626	**0.829**			
FN	0.168	0.219	**0.822**		
IFN	0.002	0.232	0.814	**0.853**	
BMI	0.612	0.607	0.396	0.338	**0.802**

4.3 Structural model

Smart PLS 3.0 is used to test the proposed research model and hypothesis. As the research refers to the interaction effects of formal and informal networks, we use moderated multiple regression to test the hypothesis. In the first step, we analysis the effects of AL and EL on BMI, and the mediated role of EL between AL and BMI. In the second step, the moderated effects of formal network and informal network are examined. According to the results, the structural paths of the supported hypotheses exhibit p-values less than 0.05, and the model accounts for 49.9% of the variance (R^2=0.499, p=0.000). In addition, the standardized root mean square residual (SRMR) is 0.077, which is less than 0.08, and the goodness of fit index (GFI) is 0.837, which is greater than 0.8, and the $\chi2/d.f$ is 3.322,which is less than 5. The square root of the AVE of each construct is higher than its correlations with other constructs. Overall, these results give the conclusion that the convergent and discriminant validity of measurement model is satisfactory, so the overall model represents good fit.
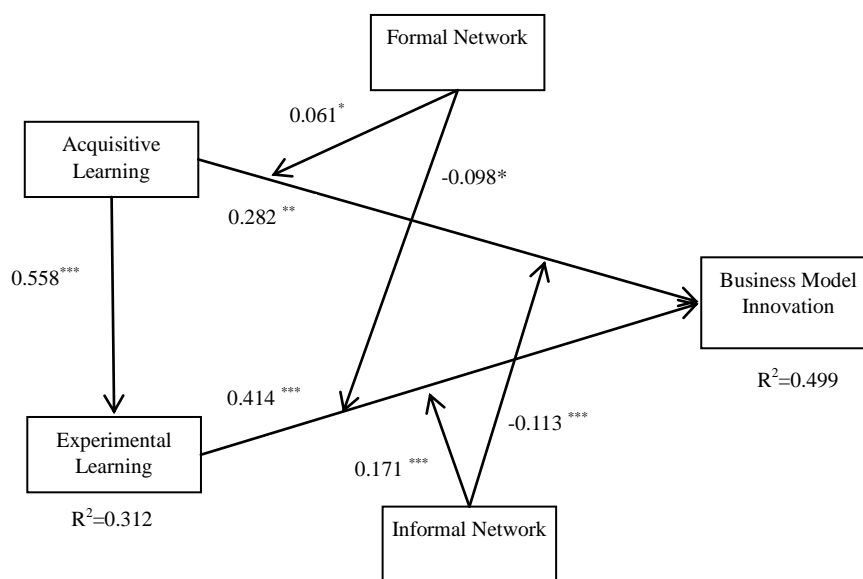
Notes: *,**,*** Significance level at p <0.05; p<0.01; p<0.001 respectively

Fig1. Results of structural model

Table 5.   Results of hypothesis tests

Path	Standardized Coefficient	T Statistics	P Values	Hypothesis test
Step1: Main effects				
AL -> BMI	0.282	3.340	0.001	H1 is supported
EL -> BMI	0.414	5.568	0.000	H2 is supported
AL -> EL	0.558	8.999	0.000	H3 is supported

Path	Standardized Coefficient	T Statistics	P Values	Hypothesis test
Step 2: Interaction terms				
FN×AL -> BMI	0.061	2.078	0.038	H4 is supported
FN×EL -> BMI	-0.098	2.699	0.007	H5 is supported
IFN×AL -> BMI	-0.113	4.229	0.000	H6 is supported
IFN×EL -> BMI	0.171	4.636	0.000	H7 is supported

Figure1 and Table 5 exhibit the results of the path coefficients along with the significance and t-statistics, with the reflection that all the hypotheses are supported. The proposed hypothesized relationships are tested to examine the structural equation model. In particular, H1 and H2 are significantly at 0.001 levels, so both AL and EL are positively related to BMI. To examine the mediated role of EL between AL and BMI, we calculate the VAF which is 0.45 (VAF=$0.558 \times 0.414/(0.558 \times 0.414+0.282)$), it proves to be the partial mediated role($0.2<$VAF<0.8). Thus, the EL plays the partial mediated role between AL and BMI, so H3 is supported. H4 is significant at 0.05 levels, suggesting the FN plays the positive mediated role between the relation of AL and BMI. H5 is significant at 0.001 levels, reflecting the negative mediated role of FN to the relation between EL and BMI. H6 and H7 are also significant at 0.001 levels, which means the IFN positively mediates the relation between EL and BMI, but negatively mediates the relation of AL and BMI.

5. CONCLUSION

First, both AL and EL can significantly promote BMI, because various knowledge may be may largely needed for start-ups in the beginning[4]. Second, two types of OL are related internally, and EL plays a partial mediating effect between AL and BMI, EL can help the new firms to absorb and understand the knowledge captured outside the organization[6].Therefore, to perform the BMI, both OL and its internal interactions should be emphasized [13]. Third, when the network is introduced, the relationship between OL and BMI has changed[5],because the formal and informal networks are significantly different, which would generate different effects on the relation between OL and BMI. From this respect, start-ups with different abilities in OL and EL should engage in different network activities. In particular, when the capability of AL is strong, formal network relations should be emphasized, and entrepreneurs should be cautious of the cognitive locking from informal network, which may hinder BMI. When EL ability is strong, informal network relationships should be highly considered, and they need to fully utilize the informal network relations with more active communication with other members. In short, start-ups should fully consider both the internal organizational learning and the external network to promote BMI.

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