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Business Model Innovation and Firm Performance: A Meta-Analysis

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Abstract. Under the background of the Internet era, business model innovation has received increasing attention from scholars. Although previous studies have discussed the impact of business model innovation on firm performance, empirical research has presented inconsistent conclusions. Based on 58 empirical studies, this paper uses meta-analysis to study the relationship between business model innovation and firm performance and the contextual factors that influence the relationship between them. The results show that the relationship between business model innovation and firm performance is positive and significant. Among the contextual factors, power distance, enterprise life cycle, the degree of regional development are positively adjust the relationship between them, individualism, the degree of uncertainty avoidance, industry characteristics, enterprise size have no significant influence on the relationship between them.

Introduction

With the rapid development of Internet information technology, business model innovation has received extensive attention in the academic circles in recent years[1]. Business model innovation can not only enhance the competitive advantage, but also be able to respond to the rapid changes in the business environment. Although previous studies have theoretically shown that business model innovation can have a positive impact on companies, the results of empirical research produce different conclusions. E.g. studies by Clauss(2016) Bonazzi(2016) show that there is a positive correlation between business model innovation and firm performance[2-3], while Chander et al (2015) conclude that there is a U-shaped relationship between business model innovation and firm performance[4]. The reasons for the above differences are related to the contextual factors of business model innovation. Therefore, this paper will use the meta-analysis method to analyse the existing empirical research results on the relationship between business model innovation and firm performance, and explore the impact of business model innovation on firm performance and its contextual. It is hoped that by correcting the sample and measurement errors, more objective conclusions can be drawn on the relationship between them, and guidance can be provided for the practice of business model innovation.

Research Methods

Literature Search and Screening

In order to ensure the comprehensiveness of the relevant empirical research literatures, this paper searches Chinese and English literature from the main database and Google Scholar. The searched databases include: Emerald, EBSCO, Springer Link, Elsevier Science etc. The literatures are screened according to the following criteria: (1) They must be empirical research; (2) Outcome variables must reflect firm performance, predictors must include business model innovation; (3) The literatures must provide a correlation coefficient r between business model innovation and firm performance or its statistical value can be converted to r; (4) They must be an independent sample. After screening and selection, 58 articles are finally included in the study, including 37 Chinese literature, 15 English literatures, and 6 master's thesis.

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Variable Measure

This paper divides the variable categories according to relevant standards:

Main Variables. This paper argues that business model innovation is a transformation of the core elements of a business model, creating value for companies and customers[5]. In this paper, performance measurement does not distinguish between financial, market, customer and other forms, but is regarded as performance.

Moderator Variables. According to the framework of the Dutch scholar Hofstede's assessment culture, the national culture selects the three dimensions of power distance, individualism or collectivism, uncertainty avoidance, and according to the scoring standard (http://geert-hofstede.com) to divide. The scale of the enterprise is divided into large enterprises, small and medium-sized enterprises with a threshold of 500 people. According to previous studies about industry characteristics[6], firms are classified into high-tech industries and low-tech industries[7]. According to the life cycle, enterprises are divided into emerging enterprises and mature enterprises. It is divided into developed areas and underdeveloped areas according to the degree of regional development.

Analysis Process

After the literature screening, the coding table is based on the description item and the effect value statistics item, and the STATA software is selected for the meta-analysis. First, calculate the main effect value. The correlation coefficient r is converted to Fisher's Z value; then calculate the weighted average of Fisher'Z to obtain the main effect value. Second, moderator variable effect analysis and regression testing are carried out, then all the moderator variables are sub-grouped and 0-1 variable regression. The cultural dimension is grouped according to the scores (The score >50 is high, the score ≦50 is low). The remaining variables are subgrouped and 0-1 variable regression according to their respective classification criteria.

Research Results

Main Effects and Homogeneity Analysis

The homogeneity test is the premise of combining the independent research effect values. Most of the researchers use the Q test to investigate the homogeneity of the research. The results of the paper on the main effect value and homogeneity test of the meta-analysis of business model innovation and firm performance are shown in Table 1.

According to the results in Table 1, the Q value is 1143.02 ($p < 0.001$), indicating that each effect value is heterogeneous and meet the requirements for using this method. The I^2 value is 95%, indicating that 95% of the observed variation is due to the true difference in effect values, and the Tau^2 value is 0.0705, indicating that 7.05% of the variation can be used as a weight calculation. The effect value between business model innovation and firm performance is 0.416, which is significant over the 95% confidence interval, with a Z value of 11.52 ($p<0.001$). According to Lipsey (2001), when the effect value $r \geq 0.40$, it is highly correlated [8]. Therefore, business model innovation is significantly related to firm performance.

Table 1 Meta-analysis main effect and homogeneity test

Method	r	95% Cl		Asymmetric		Q	Tau^2	I^2
		Lower	Upper	Z_value	P_value			
Fixed	0.377	0.361	0.392	47.8	0	1143.02***	0.0705	95.00%
Random	0.416	0.346	0.487	11.52	0			

Moderator Variables Analysis

In order to examine the influence of cultural background, industry characteristics, enterpris size, enterpris life cycle and regional development degree on the relationship between business model

innovation and firm performance, subgrouping and regression analysis were carried out respectively. The results are shown in Table 2 and Table 3.

Table 2 Subgroup analysis results

Moderator	K	N	r	95% CI	Q	I^2	Tau^2	Z	Fail-safe N
Power distance									
Low	9	3266	0.210	[0.109, 0.311]	54.2^{***}	85.20%	0.0189	4.09^{***}	302
High	49	13047	0.455	[0.373, 0.537]	1027.29^{***}	95.30%	0.0797	10.92^{***}	8702
Individualism									
Low	47	12554	0.434	[0.356, 0.512]	858.14^{***}	94.60%	0.0689	10.91^{***}	3896
High	11	3759	0.343	[0.159, 0.526]	281.33^{***}	96.40%	0.0912	3.66^{***}	1042
Uncertainty avoidance									
Low	50	13313	0.413	[0.337, 0.489]	926.12^{***}	94.70%	0.0698	10.64^{***}	4501
High	8	3000	0.440	[0.221, 0.660]	210.79^{***}	96.70%	0.0952	3.94^{***}	923
Industry characteristics									
High	16	3510	0.494	[0.357, 0.631]	242.94^{***}	93.80%	0.072	7.07^{***}	3584
Low	1 5	3737	0.366	[0.216, 0.516]	283.25^{***}	95.10%	0.0823	4.79^{***}	1750
Mixing	27	9066	0.399	[0.306, 0.492]	477.2^{***}	94.60%	0.0558	8.42^{***}	7229
Enterprise scale									
SME	35	8557	0.480	[0.306, 0.481]	552.25^{***}	93.80%	0.0645	8.8^{***}	946
Big	8	1954	0.394	[0.317, 0.644]	90.67^{***}	92.30%	0.0507	5.76^{***}	966
Mixing	15	5802	0.436	[0.282, 0.590]	406.69^{***}	96.60%	0.0878	5.55^{***}	2605
Enterprise life cycle									
Emerging	25	5485	0.508	[0.398, 0.618]	397.82^{***}	94.00%	0.073	9.04^{***}	8876
Mature	16	3272	0.357	[0.257, 0.456]	122.3^{***}	87.70%	0.0357	7.04^{***}	1716
Other	17	7556	0.341	[0.220, 0.463]	396.38^{***}	96.00%	0.0605	5.52^{***}	2607
Regional development									
Developed	11	3488	0.456	[0.373, 0.537]	979.22^{***}	95.30%	0.0774	10.87^{***}	490
Undeveloped	47	12825	0.247	[0.193, 0.386]	110.32^{***}	90.00%	0.0372	3.96^{***}	7114

Note: K and N represent the literature and sample size, respectively, * indicates $p < 0.05$, ** indicates $p < 0.01$ *** indicates $p < 0.001$

Table 3 Results of regression analysis

Variable	β	S.E.	t	p value	Tau^2	I^2	Adj R^2
Power distance	0.248	0.091	2.72	0.009	0.058	94.82%	10.88%
Individualism	-0.091	0.089	-1.02	0.312	0.065	95.09%	0.07%
Uncertain avoidance	0.028	0.102	0.27	0.786	0.066	95.07%	-1.80%
Industry characteristics	0.007	0.043	0.17	0.863	0.066	94.98%	-1.88%
Enterprise scale	0.025	0.041	0.62	0.541	0.066	94.94%	-1.21%
Enterprise life cycle	-0.087	0.04	-2.16	-0.035	0.061	93.90%	6.51%
Regional development	-0.208	0.086	-2.44	0.018	0.06	94.86%	8.66%

Power distance. From the sub-group analysis results in Table 2, the Q value of the high power distance is 1027.29 ($p<0.001$), and the low power distance is 54.2 ($p<0.001$), indicating that the heterogeneity test within the group is significant, and the value of Fail-safe N is high, so the results of both sets of analysis are relatively stable. The effect value of high powert distance is larger than the low power distance, indicating that the higher the power distance, the stronger the influence of business model innovation on firm performance. According to the regression analysis results in Table 3, the power distance regression coefficient is positively and significantly ($B=0.248$, $p<0.01$).

Individualism. The high individualistic Q is 281.33 ($p<0.001$), and the low individualistic Q is 858.14 ($p<0.001$). There is significant heterogeneity within the group, and the Fail-safe N is high. The results are relatively stable. The high individualistic effect value ($r=0.343$) is smaller than the low individualistic effect value ($r=0.434$), and the influence of low individualism on the relationship between business model innovation and firm performance is greater than that of high individualism. However, according to the regression analysis results in Table 3, the regression coefficient is negative and not significant ($B=0.091$, $p>0.05$).

Uncertain avoidance. It can be seen from Table 2 that the Q value of high uncertainty avoidance is 210.79 ($p<0.001$), and low uncertainty avoidance is 926.12 ($p<0.001$). There is significant heterogeneity in the intra-group, and the value of Fail-safe N indicates the results of the analysis are stable. The effect values of high and low uncertainty avoidance are 0.44 and 0.413 respectively, and there is no significant decrease in the effect values of the two groups. According to the regression analysis results in Table 3, the regression coefficient is not significantly .

Industry characteristics. The Q value of the high-tech industry is 242.94 ($p<0.001$), and the low-tech industry is 283.25 ($p<0.001$). The intra-group heterogeneity test is significant, and the analysis results of both groups are stable (fail-safe $N > 100$). However, according to the regression analysis results in Table 3, the regression coefficient is positively but not significantly ($B=0.007$, $p>0.05$).

Enterprise size. It can be seen that there is significant heterogeneity within the two groups of large enterprises and SMEs, and the analysis results of both groups are stable (Fail-safe $N > 600$). The effect value of large enterprises is low, indicating that the smaller the scale of the enterprise, the stronger the impact of business model innovation on firm performance. However, according to the Table 3, the regression coefficient is positively but not significantly ($B=0.541$, $p>0.05$).

Enterprise life cycle. The Q value of emerging companies is 397.82 ($p<0.001$), and mature enterprises is 122.3 ($p<0.001$), indicating that the heterogeneity test within the group is significant, and the value of Fail-safe N is high, so the results of the two groups of analysis are relatively stable. The effect value of emerging enterprises($r=0.508$) is significantly larger than that of mature enterprises($r=0.357$), indicating that the longer the establishment of the enterprise, the less the impact of business model innovation on firm performance. As can be seen from Table 3, the regression coefficient of the enterprise life cycle is negative and significant($B=-0.087$, $p<0.05$).

The degree of regional development. The Q value in developed regions is 979.22 ($p<0.001$), and in underdeveloped regions is 110.32 ($p<0.001$), indicating that the heterogeneity test within the group is significant, and the value of Fail-safe N is larger, so the results of the two groups of analysis are stable. The effect value of developed regions ($r=0.456$) is larger than that of underdeveloped regions ($r=0.247$), indicating that the higher the developed urban areas, the stronger the impact of business model innovation on firm performance. At the same time, according to the Table 3, the regression coefficient of the regional development degree is negative and significant ($B=-0.208$, $p<0.05$), which is consistent with the sub-grouping result.

Research Conclusions and Prospects

Conclusions

The main effect meta-analysis results show that there is a significant positive relationship between business model innovation and firm performance. Therefore, business model innovation can help companies maintain sustainable competitive advantage and improve firm performance in a rapidly changing business environment.

The results of this paper show that power distance, enterprise life cycle stage and the regional development level have significant positive relationship with the relationship between business model innovation and firm performance. However, individualism, uncertainty avoidance, industry characteristics, and enterprise size do not have a significant impact on the relationship between them.

Therefore, business model innovation is the key for emerging companies to gain market share and enhance their comprehensive strength in the fierce market competition. In the process of business model innovation, managers should enhance their influence and appeal, and at the same time enhance their

sensitivity of enterprise innovation and change consciousness. At the macro level, enterprises should promote innovation-driven strategy and provide resources for them to carry out business model innovation.

Limitations and Prospects

First, although we made efforts to avoid selection bias in the process of gathering relevant empirical research papers, it is quite possible that relevant studies yielding different results were not included in the sample, lacking conference papers and unpublished papers. Secondly, some literatures do not provide complete data information, and the accuracy of the research needs to be improved. Future research is expected to be improved.

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