

How Does Host or Participate in Standards Influence the Ability of Enterprises to Occupy the Market?

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ABSTRACT

This study makes an important theoretical and empirical contributions to the ongoing discussion on the standardization of enterprises aiming to seize the market opportunities. We comprehensively investigate the impact of standards on the enterprise's ability to occupy the market by using the data of China innovational firms. The results show that the degree of standard total involvement which is measured by the sum of host and participation has a significant positive impact on the ability of the enterprises to occupy the market, while the influences of the standard host intensity and participation intensity on the ability of the enterprises to occupy the market both are inverted U type. While pursuing the total standards, firms should pay attention to balancing the structure of hosting and participating in standards.

Keywords: *Standard, the intensity of host, the intensity of participation, the ability to occupy the market*

1. INTRODUCTION

The man who gain standard will gain the world. Standardization is an efficient strategy to consolidate competitive advantage. According to a relevant investigation, Haier Group has increased the sales of electric water heaters by 40% by participating in the formulation and revision of an international standard for electric heaters (Zhang., 2017).[1] At the same time, it is also recognized by most scholars, believing that standards of host or participation are conducive to enterprises entering or occupying new markets (Bekkers, et al., 2002) [2]. While the existing research is still insufficient, can't answer to whether the more criteria for hosting, the stronger the ability to seize the market, and is there a difference between host and participation etc. Therefore, the objective of this paper is to analyze some of the market effect of standardization.

The following questions are central to the analysis:

- (1) How the different roles played by enterprises in the process of formulating standards (hosting or participation) influence the ability to occupy the market differently?
- (2) How brand awareness affects these relationships? i.e. Whether the high brand awareness of enterprises which plays a hosting or participation role in the process of formulating standards can promote enterprises to seize the market more easily?

The remainder of this article is organized as follows. Section 2 reviews the existing literature and analyses the theoretical framework. Section 3 presents our data and the research methodology. Section 4 provides results and discussion. Section 5 concludes and discusses the policy implications.

2. THEORETICAL FRAMEWORK

Assessing the impacts of standards has been the focus of scholars' research. Most existing empirical and theoretical work in such frameworks consider the impact dimension mainly in terms of innovation and competition (globalization of markets, market entry, the market share of dominant). For example, many literatures on standards have studied the impacts of standards from the macro and medium perspectives of countries and industries, such as the impact on national or regional economic growth, on international trade, and on industrial competitiveness. Jungmittag, et al. (1999) empirically analyzes the impact of standards on German economic growth by introducing standards into the Cobb-Douglas function.[3]. Swann, et al. (1996) focuses on the influence of different types of standards on international trade and finds in general a much higher trade promoting impact from international standards than from national standards.[4]. Blind, et al. (2010) argues ICT standards play an important role on the marketing and the distribution of ICT products and services.[5]. Sun and Ren (2013) finds a long-term equilibrium relationship between effective standard quantity and labor productivity growth which represents economic growth.[6]. Tao, Wang and Xue (2016) finds a one-way causal relationship between patent standardization and the upgrade of manufacturing value chain based on the research of 7 subsectors in China.[7]. Ye et al. (2016) finds that the implementation and application of the standards could enable China's LED industry to gain competitive advantages in the global market, especially when it has a broad domestic market.[8].

At the firm level, Mickwitz et.al (2008) argues that technology programmes based on an open standard have a potential to relieve lock-in situations in the markets to some extent by judging from the experiences of the case companies.[9]. Wu and Li (2007) theoretically analyzed that standardization can guide the direction of enterprise new product research and development, reduce the uncertainty in decision-making, and maximize the recognition of innovation results, which is the foundation for enterprises to successfully develop new products.[10]. Xu et al. (2008) also points out theoretically that enterprises can form industry or national technical standards or even international standards by a certain technology, which can form a unique advantage in the market in a certain period and make enterprises take a leading position in the industry that cannot be easily surpassed.[11]. Luo (2016) theoretically analyzes the coupling mechanism of international trade standardization and enterprise internationalization growth based on the functional effect of international trade standardization and the internal mechanism of enterprise internationalization growth.[12]. Hou and Pan (2016) empirically analyzes the impact of standardization on technological innovation of enterprises by using relevant data of Chinese listed companies from 2010 to 2013, and finds standardization significantly promoted technological innovation of enterprises.[13]. Zhou et al. (2017) empirically also analyzes the relationship between enterprise standards and innovative development from the perspective of standard-led development.[14].

There is a basic consensus in most existing empirical and theoretical frameworks: standards were seen to have major positive impacts on the markets including market entry, the market share of dominant etc. However, there is still a gap: existing research does not distinguish between enterprises is to preside over or participate in the formulation and revision of standards (Jungmittag et al. 1999; Blind et al., 2010)[3, 5]. As a matter of fact, whether an enterprise preside over or participate in the formulation of a standard has reflected the difference in the position and influence of enterprises in the industry market. Generally, the enterprises that can preside over the formulation of standards occupy the dominant position in technology and market, while the enterprises that participate in the formulation of standards are weaker than the presider. Then, whether the enterprise is in charge or participating in the standard setting may have different impacts on the enterprise. So, it is necessary to distinguish between the intensity of hosting and the intensity of participation in enterprise standards, to explore in detail the impact of participation in enterprise standards on enterprises.

According to the existing studies, we find that the impact of enterprise standardization can be realized basically through the marketization of enterprise new products or services, and become an important guarantee for enterprises to obtain profits and competitiveness (Bekkers et al., 2002; Luo, 2016; Zhou et al., 2017) [2, 12, 14]. Therefore, we link the enterprise standards with the market

occupying ability of enterprises, to explore the relationship between the two.

In addition, in the process of new products being accepted quickly by the market, enterprise brand awareness plays an important role. As one of the important strategic assets of enterprises, brand has significant market value, and its market awareness will have a major impact on the market recognition of products (Nie, 2018) [15]. A company with a high brand awareness can produce new products that are accepted by the market more quickly. Brand awareness may enhance the impact of standardization on an enterprise's ability to seize the market. To investigate the influence of brand awareness on the relationship between enterprise standards and market share, this paper intends to introduce the dummy variable of brand awareness as an important internal situational factor.

Unlike previous empirical studies, we directly divide the forms of enterprises' participation in standard formulation and modification into three categories (the total involvement, host and participation) to test the relationship between standard and the ability of enterprises to occupy the market and distinguish between the famous brand and non-famous brand.

3. DATA AND METHODOLOGY

3.1. Data

We take Chinese innovative enterprise database as the research samples which records 443 innovative enterprises data from 2008 to 2011 comprehensively, such as the total assets of enterprises, the main business income, host/participate in the standard of detailed data, invention patent, patent quantity, new product/technology of sales revenue, the number of R&D personnel, R&D funds, enterprise employers etc. After screening, matching and eliminating 38 enterprises with incomplete data records, 406 enterprises are finally selected to constitute a panel data.

3.2. Variables¹

Dependent variable: the ability of enterprises to occupy the market (*AOM*). Generally, the level of market sales revenue can reflect the size of the market occupied by the enterprise. Most measurement of enterprises' market position and ability is mainly related to the market sales revenue (Zhang, 2017) [16]. Meanwhile standards can promote the generation of new products and new processes and gain the sales revenue of new products and new processes from opening new markets. we measure the

¹ In order to avoid the situation that the original data of *AOM* has zero, we add 1.to the original data when we take the logarithm. Neither *TIS* is 0, so this operation is not required.

ability of enterprises to occupy the market (*AOM*) by the sales revenue of new products and new processes. Independent variables: standards (*ST*). According to the role of the enterprise in the standard formulation and revision process, we directly divide the forms of enterprises' standards into three categories: the total involvement, host and participation. The total involvement (*TIS*) is judged by the sum of the host standard and the participation standard, i.e. the total number of enterprise standards. The intensity of host (*IHS*) is expressed by the proportion of the hosting standards in the total number of enterprise standards. The intensity of participation (*IPS*) is measured by the proportion of the enterprise participation standards in the total amount of enterprise standards. Other variables. Brand awareness (*BS*) is an important factor that affects whether the company's new products can be quickly accepted by the market. It's a dummy variable, measured by whether the company is a well-known trademark. "1" means the company is a well-known trademark, or else it's "0". marketing ability (*MC*) plays a major role in affecting the enterprise's ability to occupy the market. We introduce the per capita sales income of main business to control the impact of this change. In addition, most scholars believe that there is a collaborative correlation between technological innovation and standards (Tao, et al., 2016; Zhou et al.,2017) [7,14]. Therefore, when considering the standard endogeneity problem, we introduce the strength of enterprise invention patent (*IPA*, measured by the proportion of invention patents granted to enterprises in the total number of authorized patents), R&D intensity (*RDS*, measured by the proportion of R&D investment in sales revenue), R&D human capital (*HR*, measured by the proportion of R&D personnel in employees), enterprise scale (*SIZE*, expressed by the natural logarithm of the total assets of the enterprise), and the relationship with government (*GR*, measured by the number of deputies to the people's Congress and members of the CPPCC owned by the enterprise) to control.

3.3. Model Design

The main purpose of this paper is to investigate the relationship between enterprise standard and the ability of enterprises to occupy the market and to explore whether there is a linear or non-linear relationship between the two. Considering the standard endogeneity problem, the two-stage (2sls) regression method was used in this paper. The basic models involved are shown in formula (1) and formula (2). Formula (1) exams the linear relationships and formula (2) investigates the curvilinear relationships.

$$\begin{cases} ST = \alpha_{11}SIZE + \alpha_{12}IPA + \alpha_{13}Control + \varepsilon \\ AOM = \alpha_{21}BS + \alpha_{22}MC + \beta_{21}ST + \varepsilon \end{cases} \quad (1)$$

$$\begin{cases} ST = \alpha_{11}SIZE + \alpha_{12}IPA + \alpha_{13}Control + \varepsilon \\ AOM = \alpha_{21}BS + \alpha_{22}MC + \beta_{21}ST + \beta_{21}ST^2 + \varepsilon \end{cases} \quad (2)$$

Where *ST* includes *TIS*, *IHS*, *IPS* and ε is the residual term, Control includes *RDS*, *HR* and *GR*.

4. RESULTS AND DISCUSSION

4.1. Descriptive Analysis

Table 1 describes and analyzes the core variables of the samples. It is found that enterprises pay more and more attention to standardization. As shown in Figure 1, the average value of the total involvement in standards from 2008 to 2011 shows an increasing trend, and the enthusiasm of enterprises to involve in the standards keeps increasing. However, there is a significant difference between the standard total involvement of enterprises (see Table 1). The standard deviation is 1.528, among which 283 observed values are 0, the rest are greater than 0 and the maximum value is 7.065. In addition, it can also be seen that the current enterprise standard participation intensity is slightly higher than the hosting intensity, and the mean of the participating intensity is 0.5478, which is greater than the mean of the hosting intensity is 0.452. The mean value of the market occupying capacity is 11.058, the maximum value is 17.490, and only 43 observed values are 0.

4.2. The Relationship between TIS and AOM

Using stata12.0, the impact of the total involvement in enterprise standards (*TIS*) on the ability of enterprises to occupy the market (*AOM*) is shown in Table 2. Neither model 1 nor model 3 contains control variables. Model 1 tests the linear relationship between *TIS* and *AOM*, while model 3 exams the non-linear relationship. Model 2 and model 4 introduce control variables based on model 1 and model 3 respectively, which is also a robust test.

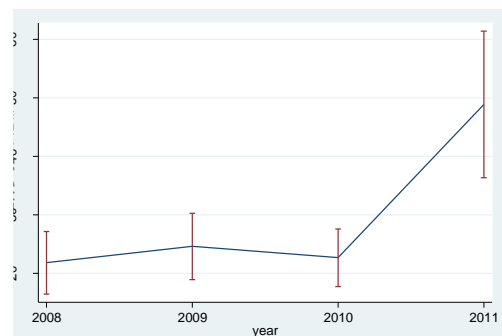


Figure 1 The mean of the total involvement from 2008 to 2011 (original data)

Table 1 Description statistics of key variables

Variables	Mean	S.D.	Min.	Max.
<i>AOM</i>	11.058	2.774	0	17.490
<i>TIS</i>	2.1212	1.528	0	7.065
<i>IHS</i>	.452	.369	0	1
<i>IPS</i>	.548	.369	0	1

Table 2 The relationship between TIS and AOM

	(1)	(2)	(3)	(4)
	AOM	AOM	AOM	AOM
TIS	1.188*** (2.97)	1.036** (2.53)	0.319 (0.27)	0.522 (0.43)
TIS ²			-0.045 (-0.22)	-0.081 (-0.40)
BS		0.346* (1.66)		0.433** (2.34)
MC		0.000 (0.34)		0.001 (1.21)
_CONS	8.537*** (10.04)	8.681*** (10.35)	10.687*** (9.20)	10.222*** (8.62)
N	1624	1624	1624	1624

T value in brackets, * p < 0.1, ** p < 0.05, *** p < 0.01, next table is the same as.

Table 2 shows that whether control variables are introduced or not, there is a significant positive linear relationship (see model 1 and model 2) between the total involvement in enterprise standards (TIS) and the ability of enterprises to occupy the market (AOM), while the non-linear relationship fails the test. According to model 1, it can be concluded that the relationship between TIS and AOM is as shown in Formula (3)

$$AOM = 1.188TIS + 8.537 \quad (3)$$

When the enterprise does not participate in the formulation or revision of standards, its market occupying capacity is 8.537. When the total involvement of the enterprise standard is 1, the ability of the enterprise to occupy the market is increased to 9.725. That is, with the increase of total involvement (TIS), the enterprise's ability to occupy the market (AOM) also increases. For every 1% increase in total involvement in enterprise standards, the enterprise's ability to occupy the market increases by 1.188%, as shown in Figure 2. Consistent with Bekkers et al. (2002) [2], enterprise standards are conducive to the marketization of new products and the improvement of enterprises' ability to occupy the market. The reason lies in: the enterprises host or participate in the standard can grasp the development trend of product technology in time, update products in time, and meet the market demand; At the same time, the standard also reflects the product quality from another aspect. Products conforming to the new standard can be accepted by the market relatively quickly and improve the enterprise's ability to occupy the market.

To verify the accuracy of the equation, the annual mean value of the total involvement was selected and substituted into the equation. The predicted value and actual value of the ability of the enterprise to occupy the market in each year are shown in Table 3. It can be found that the fitting degree between the predicted value and the actual value is relatively high, with the absolute error within 0.3 and the relative error within 0.05.

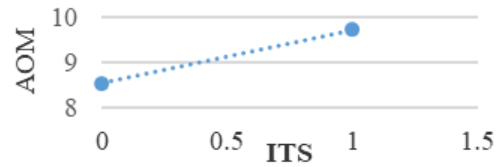


Figure 2 TIS and AOM

Table 3 The predicted value, actual value and error of AOM under TIS

Year	TIS	Predicted value	Actual value	Absolute error	Relative error
2008	1.988	10.898	11.062	0.164	0.015
2009	2.124	11.060	10.922	0.138	0.013
2010	2.002	10.915	11.172	0.257	0.023
2011	2.372	11.355	11.077	0.278	0.025

4.3. The Intensity of Host/Participation and the Ability of the Enterprise to Occupy the Market

The relationship between the intensity of host/participation strength and market occupying capacity is shown in Table 4. We examine the linear and nonlinear relationship in the absence of control variables separately. Due to results of the linear relationship fail to passed the significant test, the regression results are only nonlinear.

As can be seen from Table 4, no matter whether control variables are introduced or not, the nonlinear relationship is significant, that is, there is an inverted u-shaped relationship between the intensity of host/participation strength and market occupying capacity. According to model 5 and model 7, the relationship between the intensity of host/participation and the market occupying capacity of enterprises is obtained as follows:

Table 4 Results of IHS/IPS and AOM

	(5)	(6)	(7)	(8)
	AOM	AOM	AOM	AOM
IHS	25.300*** (2.90)	24.443*** (2.96)		
IHS ²	-22.841*** (-2.90)	-22.067*** (-2.96)		
IPS			24.069*** (2.76)	23.554*** (2.65)
IPS ²			-21.713*** (-2.77)	-21.242*** (-2.66)
BS		0.557** (2.00)		0.557** (2.03)
MC		0.000 (0.24)		-0.001 (-0.77)
_CONS	6.700*** (6.02)	7.542*** (6.04)	6.650*** (5.59)	7.561*** (5.42)
N	1339	1339	1339	1339

IHS: $AOM = -22.841IHS^2 + 25.3IHS + 6.7$ (2)

IPS: $AOM = -21.713IPS^2 + 24.069IPS + 6.65$ (3)

According to equation (2) and (3), Table 5 presents the predicted value of the enterprise's market occupying capacity, as well as the absolute and relative errors between the predicted value and the actual value. It is found that the relative errors are all within 0.20 which means the fitting degree of the curve is good.

Table 5 The predicted value, actual value and error of AOM under HIS/IPS respectively

Year	IHS	Predicted value	Actual value	Absolute error	Relative error
2008	0.460	13.505	11.334	2.171	0.192
2009	0.452	13.470	11.284	2.186	0.194
2010	0.447	13.448	11.487	1.961	0.171
2011	0.449	13.454	11.428	2.026	0.177

Year	IPS	Predicted value	Actual value	Absolute error	Relative error
2008	0.540	13.316	11.334	1.982	0.175
2009	0.548	13.319	11.284	2.035	0.180
2010	0.553	13.320	11.487	1.833	0.160
2011	0.555	13.320	11.428	1.892	0.166

Derivation of (2) and (3) respectively to obtain the maximum value of AOM: when IHS=0.5538, the market occupying capacity of the enterprise reaches the maximum value AOM=14.7059. When the intensity of participation IPS=0.5543, the enterprise's market occupying capacity gets the maximum value AOM=14.3202, as shown in Figure 3. This shows that the influence of enterprise's standard (the intensity of host or participation) on the enterprise's ability to occupy the market is not a simple linear relationship, and there is an optimal solution. To be specific, when the standard hosting intensity of an enterprise is less than 0.5538, the hosting intensity is positively correlated with the enterprise's market occupying ability. However, when the enterprise hosting intensity exceeds 0.5538, it is negatively correlated with the enterprise's ability to occupy the market, and further raising the standard hosting intensity is not conducive to the enterprise occupying the market. For the intensity of participation, when it is less than 0.5543, the enterprise's market occupying capacity increases with the growth of the standard participation intensity, and the two are positively correlated. While the participation intensity is greater than 0.5543, the enterprise's market occupying capacity decreases with the increase of the standard participation intensity, and the two are negatively correlated. This mainly lies in that although participating in the formulation or revision of standards can enhance the enterprise's ability to occupy the market, it is a complicated task to take charge of the formulation or revision of standards and the intensity of enterprise's

hosting and participation is not easy to be too high limited by the enterprise's own ability.

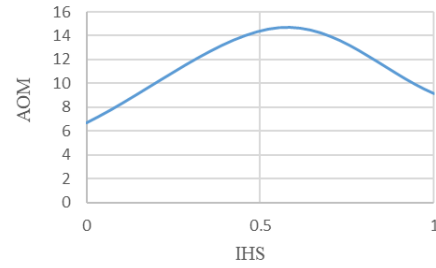


Figure 3-1 IHS and AOM

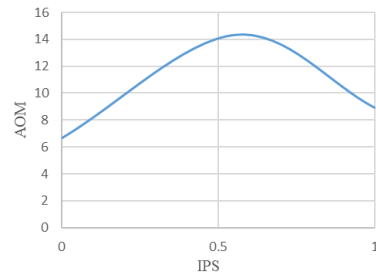


Figure 3-2 IPS and AOM

Figure 3 the relationship between the standards intensity and market occupying capacity

According to the regression results, we can also find the optimal standard host intensity and close to the optimal participation intensity, but host was slightly greater than the participation (0.5543 > 0.5538), which on the other hand, confirmed the fact that the host standard involved workload than the participation. In addition, it is worth mentioning that the enterprise brand awareness as control variables, influence the ability of the enterprise to occupy the market positively whether investigate the total involvement or host/participation. It hints famous the enterprise brand awareness is an important factor affect the ability of the enterprise market and brand enterprises to launch new products more easily recognized and accepted by the market.

5. CONCLUSIONS AND IMPLICATIONS

This study makes an important theoretical and empirical contributions to the ongoing discussion on the standardization of enterprises aiming to seize the market opportunities. By using the database of China's innovation-oriented enterprises from 2008 to 2011, we comprehensively study the relationship between standards and the ability of enterprises to occupy the market. We find that the total involvement in standards is significantly positive correlation with the enterprise market ability, and both the intensity of the host and the intensity of the participation are inverted u-shaped with the enterprise market ability respectively.

For enterprises, it is necessary to play the role of enterprise standardization to improve their ability to occupy new markets. First, enterprises should actively participate in the formulation and modification of standards, understand and grasp the trend of product development, strive to have a voice in the industry, which is conducive to produce products that meet market requirements and standards. Second, while raising standards in total, we must keep the balance between host and participation, and allocate the specific gravity of the host and participation rationally. And we should also try to match the brand awareness and the specific gravity of the host and participation, for example, enterprises with famous brand awareness, the proportion of host standards can slightly higher.

The paper only discusses the impact of standard participation on enterprises' market occupation, and does not consider other external contextual factors such as enterprise type and location, so the follow-up research can be further expanded.

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