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External Environments and Standardization

외부환경요인과 표준화에 관한 연구

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ABSTRACT

This study examines the effect of external environments such as technological change and competitive intensity on standardization. It was empirically tested by a Korean sample to verify the validity of the research framework. The empirical result confirms that external environments increase the odds of marketing standardization and technology standardization. The result also indicates that technology change and global standardization are related. The data support that firms facing a high rate of technology change stress marketing and technology standardization. The result also confirms that competitive intensity directly influences marketing standardization.

Key words : Technology change, Competitive intensity, Standardization

Ⅰ. Introduction

The standardization/adaptation question is one of the perennial questions asked in international marketing research. In particular, when introducing new products in international markets, standardization and adaptation are of significant concern to companies because product standardization usually generates greater cost savings than is the case for promotional policy (Hovell and Walters, 1972). Standardization (conversely, customization) refers to using a common programme and process on a worldwide basis. Regarding the advantages and disadvantages of standardizing versus adapting strategies, lack of consensus in this area is not surprising. Levitt (1983) argues that international companies should standardize and they must learn to operate as if the world is a large single market, ignoring superficial regional and national differences. He calls for overall standardization, that is, less segmentation and adaptation worldwide.

The total standardization perspective emphasizes the trend towards the homogenization of markets and buyer behaviour and the substantial benefits resulting from standardization (Zou et al., 1997). Among environment-related factors (e..g., the economic, cultural, political, and legal environments), competition and technology change have made firm's standardization/ adaptation of marketing and technical activities ever more important to the improvement of international business in overseas markets. In particular, technology is making the world more homogeneous. Levitt (1983) cites technology as the driving force for globalization, arguing that improved communications technology, the increasing availability of technology in developing countries as well as the declining cost of such technology mean that consumer needs are becoming increasingly homogeneous, allowing organizations to market the same product in many markets, with only minimal adaptation. In addition, technological advancements have diminished cultural differences across countries and thus make a globally standardized marketing strategy the preferred choice to capture worldwide economies of scale (Levitt, 1983).

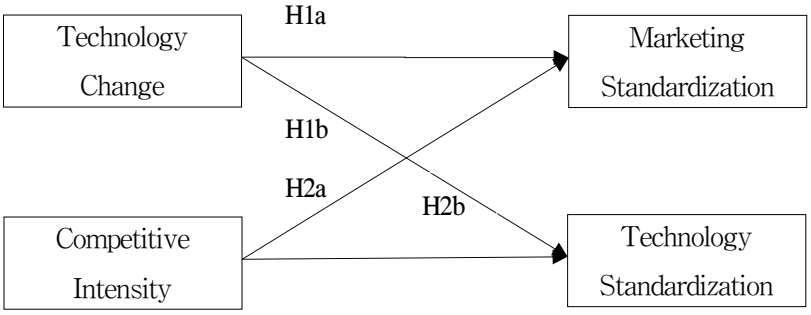
Given the globalization trend, world markets are becoming increasingly similar a standardized approach toward sourcing, production, marketing, and other functions is both feasible and desirable. An increasing internationalization of business is also an indication of globalization (Dunning et al., 2007), compelling companies to pursue standardization because of economic integration and increasing interdependence, resulting in intense competition. The increased size of

the market will stimulate competition. The rapid development and change of technology promotes globalization. The advent of major trading blocks, such as the European Union and the North American Free Trade Agreement implies that regional standardization is superior to adaptation. In reality, practices and products are more standardized (Boddewyn et al., 1986).

In the past decades, technological changes have become more frequent and global competition has made it difficult to compete on price alone. With globalization and intensifying competition, standardization is considered perhaps the most influential aspect of international marketing strategy (Zou and Cavusgil 2002), because it enables companies to save costs and effort in marketing their goods and services on a global scale. Sales can be increased by developing a consistent image of the product across national markets and costs can be lowered by pooling production activities across countries, moving production to low-cost locations without redefining the production process, and capturing the economies associated with formulating and implementing a single marketing plan (Szymanski et al. 1993). In addition, major reasons for accelerating the new product development process are competitive pressures and rapid technological changes (Gupta and Wilemon, 1990). Empirically, customization of product technology increases the likelihood of delays in the completion of new product development projects and multi-country rollout (Chryssochoidis and Wong, 2000). If all products and components are standardized, the manufacturing division can retain the advantages of large-scale production (Kotabe, 1998). Particularly companies competing in an environment of rapid technological change adopt global standardization and consolidate their global operations (Samiee and Roth, 1992). In addition, Foreign market conditions and competitors are significant factors for standardization and adaptation (Akaah 1991; Cavusgil et al. 1993; Whitelock and Pimblett 1997). Therefore, to answer the research questions concerning the effect of technology change and competitive intensity on standardization, I investigated the relationship between standardization and (1) the technological change and (2) competitive intensity.

Ⅱ. Conceptual model and Hypotheses

Figure 1 presents the proposed conceptual framework followed by the discussion of the rationale for the proposed model to develop specific hypotheses. The current research model basically comprises four constructs (i.e., technology change, competitive intensity, marketing standardization, and technology standardization). Two constructs (i.e., technology change and competitive intensity) are associated with technology standardization as well as marketing standardization.



〈Figure 1〉 Conceptual Framework

1. The Impact of Technology Change on Standardization

For internationally marketing standardized products, companies need economies of scale, which decreases production costs per unit of output, in order to successfully compete with other international companies (Walker et al. 1992). Technology is also becoming a decisive factor which affects the degree of standardization (Cavusgil et al. 1993; Robles and Akhter 1997). Technological turbulence requires intensive resource investment in order to sustain development practices and the maintenance of technological norms (Kohli and Jaworski, 1990). A relatively slow pace of technology change enables firms to address local needs and preferences (Samiee and Roth, 1992).

High technology products are more suitable for standardization than consumer products (Jain, 1989), because companies in industries characterized by rapid change have less time to plan adequately and implement global strategy in numerous affiliates (Samiee and Roth, 1992). Globally

concentrated manufacturing and uniform characteristics of high technology products make them a prime candidate for standardization (Porter, 1986). The literature reports a positive relationship between technological intensity and export marketing strategy (Cavusgil and Zou, 1994). Such products have rapid obsolescence rates and, thus, firms have neither the time nor the resources to adopt customized strategies for each market (Samiee and Roth, 1992). This condition demands rapid, if not simultaneous, market entry and roll-out in all potential markets. Concurrently, new technologies require new production platforms (i.e., retooling) that tend to be expensive and require a high yield to be profitable.

Many high-tech industries currently face the challenge of high levels of product homogeneity as offerings from their component suppliers are undifferentiated, including computer memory, television parts, and disk drives (Greenstein 2004; Kohli and Thakor 1997). As such, product homogeneity is considered an important phenomenon of marketing competition (Heil and Helsen 2001). It is likely that the cost savings and other benefits accruing from uniform policies in these areas generally will be rather limited, and that corporate practice reflects this situation (Walters, 1986).

Multinational companies use marketing methods targeted to realize large market shares based on globally standardized products (Cateora et al.,, 2009). Firms have to standardize their marketing strategies across nations in response to increasing technological intensity and velocity (Katsikeas et al., 2006). When the technology is stable, there is an added incentive for customizing the product for local markets (Samiee and Roth, 1992). Therefore, the relative stability of technology in the industry may allow competitors to become more responsive to the needs of local markets through a higher level of customization to meet local needs and preferences (Samiee and Roth, 1992).

Consequently,

H1a: *The technological change is positively related to the degree of marketing standardization*

H1b: *The technological change is positively related to the degree of technology standardization*

2. The Impact of Competitive Intensity on Standardization

Competitive intensity in foreign markets can exert an impact upon firms' marketing strategy (Sousa et al. 2008; Zou and Stan 1998). The optimal degree of standardization also depends on external environmental factors (Zou et al., 1997). Among environment-related factors (e..g., the

economic, cultural, political, and legal environments), the increased competition worldwide has made international marketing decisions ever more important to the survival, growth, and profitability of multinational corporations. Jain (1989) posited that the greater the degree of similarity in a firm's competitive position in different markets, the higher the degree of standardization. Also, competing against the same adversaries with similar market share positions in different countries leads to greater standardization than competing against purely local companies (Jain, 1989).

Subramaniam and Hewett (2004) find that competitive intensity is a significant predictor of the decision to adapt or standardize products in international markets. The changing environments facing many companies have caused them to attempt various means of reducing the time they take to develop new products. A firm in an intensely competitive international market environment faces greater time pressure on the introduction of new products into target markets. In a market without competition, a firm lacks external pressure to launch new products; whereas, in a competitive market, a firm is often forced to compete on product development time to introduce new products ahead of the competition (Li, 1999). Standardization promotes timely introduction of new products whereas customization increases the likelihood of delays in the completion of multi-country rollout (Chryssochoidis and Wong, 2000).

The pressure to standardize marketing strategies is in part related to the globalization trend and the promise that firms can leverage market similarities to standardized one or more aspects of their marketing programs (Yip, 2003). In particular, when a competitor internationally standardizes its marketing approach for greater efficiency and lower costs to gain a competitive advantage position, others are likely to follow the same path. Companies can essentially achieve the advantages of economies of scale and thus relatively low costs per unit of production (Day et al. 1988). Such companies are sensitive to competition by those who standardize their products at a global level. Firms have to standardize their marketing strategies across nations in the presence of global competitors (Lim et al., 2006).

Hence,

H2a: *Comptitive intensity is positively related to the degree of marketing standardization*

H1b: *Comptitive intensity is positively related to the degree of technology standardization*

Ⅲ. Methodology

1. Sample and data collection

Respondents were drawn from Korean manufacturing companies. To collect data, the drop-and-collect survey (DCS) method, which involves the researcher in personally delivering and later collecting the survey instrument (the questionnaire) either directly to the target respondent or indirectly via a gatekeeper (e.g., a secretary) (e.g., Ibeh *et al.,* 2004), was used. The selection of sample is based on the following considerations. First, the sampling frame consisted of the top 1,000 companies from the databases of the Korea Chamber of Commerce and Industry (KCCI). Second, the author focused on manufacturing (non-service) industries, which reduced the pool of companies to 447. Of 336 firms that had initially agreed to participate, data on 244 firms were collected. Twelve cases with incomplete answers were eliminated, yielding a final total of 232 completed, usable questionnaires (a 52% response rate), which contributed to the ensuing data analysis. Following Armstrong and Overton (1977), a non-response bias check was conducted by comparing early with late respondents. An independent samples t-test indicated that there were no significant differences at the 5% significance level, supporting the assumption that respondents were not different from non-respondents.

2. Pre-test and measures

A draft questionnaire, prepared using well-established scales drawn from the relevant literature, was subjected to a pre-test. For enhancement of the construct validity of the survey measures, eight industry experts were asked to indicate any ambiguity regarding the phrasing of the items. In addition, two academicians reviewed the questionnaire, and minor revisions were made. The researcher then contacted a random selection of 33 managers from a list of 100 Korean-based firms operating in a variety of manufacturing industries in order to test the reliability and validity of the measures with a small sample. The results of the pilot study indicated that measures loaded strongly on their corresponding constructs and showed an acceptable level of reliability.

Technology change was measured with a five-item, based on Song and Montoya-Weiss (2001).

Competitive intensity was measured with a four-item, adapted from Song and Parry (1996). In measuring *standardization*, a thorough review of the literature revealed that there was only a limited number of developed scales measuring marketing mix such as product, pricing, promotion and distribution (e.g., Hewett and Bearden, 2001; Lee and Griffith, 2004; Shoham, 1999; Subramaniam and Hewett, 2004; Theodosiou and Katsikeas, 2001; Zou and Cavusgil, 2002). That is, most previous studies automatically treat standardization of the overall marketing programme or the 4-Ps as unidimensional constructs. Accordingly, it is necessary to develop a new measure by considering the standardization of technical-related activities as well as marketing-related activities (Jain, 1989; Meijboom and Vos, 1997). The idea was to get an indication of the manifestation of a standardization-adaptation balance in terms of marketing and technical-related activities. All constructs were measured along a seven-point Likert scale, ranging from 1 = strongly disagree, to 7 = strongly agree. Table 1 presents a description of response formats and specific items for the multi-item scales.

Control variables. To eliminate potential confounds, I control for firm size, internationality, and industry type. Firm size is generally postulated to have a positive relationship with the degree of marketing standardization, because larger firms can take greater advantage of economies-of-scale, and the less flexible structures also prevent large firms from effective marketing adaptation (Schilke et al. 2009). Small firms have to adapt their marketing strategies to foreign countries (O'Cass and Julian, 2003), whereas large firms have to standardize their products, distribution, and communication across nations (Hultman et al., 2009). I measure firm size using the natural logarithmic transformation of the number of employees in a firm (Chandy and Tellis, 2000). Internationality of the firm was measured as the proportion of a firm's sales derived from operations outside the home country to total sales (Sullivan, 1994). A low level of global market participation can limit firms' abilities to achieve economies of scale and thus also limit the performance benefit gained from standardizing marketing programs (Schilke et al., 2009). To control for industry effects (the effects of product type) (e.g., Lichtenthaler, 2007), six industry dummies were created for the sectors included in the study with the 'metals and fabricated metal products' industry being used as the base group.

〈Table 1〉 Measurements

Construct	Items
Technology change	The rates (speed and pace) of the changes in the technology employed in this project were very unpredictable The technology used in this product was changing rapidly The changes in R&D technology for this project was very unpredictable The technology involved in this project was an "undeveloped science," It was very difficult to predict where the technology used in this product would be in the following 2 to 3 years
Competitive intensity	There were many competitors in target country-markets There was a strong, dominant competitor - with a large market share Potential customers were very loyal to competitors' products New product introductions by competitors were frequent
Marketing Standardization	Our company tended to standardize marketing-related activities over the countries at which the new product was targeted. - Standardized marketing programme (i.e., various aspects of the marketing mix, which can be classified as product design, product positioning, brand name, packaging, retail price, basic advertising message, sales promotion, role of salesforce, management of salesforce type of retail outlets, and customer service) - Standardized marketing process (i.e., tools that aid in programme development and implement).
Technology Standardization	Our company tended to standardize technical-related activities over the countries at which the new product was targeted. - Standardized process engineering and improvement, after-sales service, decision making on procurement and distribution and, ultimately, product development.

Ⅳ. Data analysis and results

Results were analyzed in two stages. First, the psychometric properties (reliability, convergent and discriminant validity) of the constructs used in the research model were evaluated following the suggestions of Churchill (1979) and Anderson and Gerbing (1988). Then, the measurement model (confirmatory factor analysis) was performed followed by regression analyses to test the hypotheses in the conceptual model.

1. Reliability and validity of the measurement scales

The reliability of all the scales used in the research was initially calculated using Cronbach's

alpha coefficient. The results show that internal reliability for all the scales was acceptable and ranged from 0.81 for (competitive intensity) to 0.88 for (technology change), indicating satisfactory internal consistency reliability for the measurements as suggested by Nunnally (1978).

〈Table 2〉 CFA Results for Measurement Model: Standardized Coefficient Loadings and t-values

Items	Standardized Factor Loadings (t-values)		
	Competitive Intensity (COM)	Technology Change (TECH)	Standardization
COM 1@	0.59(Fixed)		
COM 2	0.94(7.83)		
COM 3	0.73(8.60)		
TECH 1@		0.90(Fixed)	
TECH 2		0.93(13.87)	
TECH 3		0.56(9.03)	
Standardization 1@			0.90(Fixed)
Standardization 2			0.75(10.42)

@: reference variable (indicator); the way to assign a unit of measurement for a latent variable is to fix a non-zero coefficient (usually one) in the relationship for one of its observed indicators.

To further evaluate the reliability of the measures employed, as well as their convergent and discriminant validity, the researcher used confirmatory factor analyses (CFA). For the measurement model, a CFA was run on the covariance matrix of the 11 observed variables (items). Initially, a CFA using the LISREL program was conducted for three constructs (latent factors $\xi_{1,}$ $\xi_{2,}$ and $\xi_{3,}$). CFA was performed on the entire set of items simultaneously (Anderson *et al.,* 1987). The overall model fit indices demonstrate a lack of fit (chi-square value = 158.34 (degree of freedom = 41, p = 0.000), the goodness-of-fit index (GFI) = 0.889, non-normed fit index (NNFI) = 0.830, comparative fit index (CFI) = 0.873, and root mean square error of approximation (RMSEA) = 0.111).

There are several large residuals (i.e., $\geq$ |2.58|). Accordingly, further iterations were carried out, successively dropping the item with the largest standard residuals and conducting a CFA until the statistics of overall model fit are satisfactory (Byrne, 1998). The process of model re-specification resulted in the deletion of 3 items. The final model gives a chi-square value of 28.19 (degree of freedom = 17, p=0.043). Moreover, the final model shows good alternative indices: RMSEA is 0.053, NNFI value is 0.970, and CFI is 0.982. Based on these overall model fit indices, the final model is adequate. Table 2 presents CFA results for measurement model.

〈Table 3〉 Correlations and Summary Statistics

Construct	1	2	3	4	5	6	7	8	9	10	11	12
1.Internationality	1.00											
2.Firm size.	.34**	1.00										
3.Industry dummy1	.29**	.03	1.00									
4.Industry dummy2	-.08	.03	-.21**	1.00								
5.Industry dummy3	-.23**	-.08	-.26**	-.20**	1.00							
6.Industry dummy4	.10	.18**	-.17**	-.13*	-.16*	1.00						
7.Industry dummy5	18**	.02	-.15*	-.12	-.14*	-.10	1.00					
8.Industry dummy6	-.20**	-.03	-.20**	-.15*	-.19**	-.13	-.11	1.00				
9.Technology change	-.01	.10	.01	.01	.02	.12	-.18**	.01	1.00			
10.Competitive intensity	.22**	.08	.31**	-.04	-.13*	-.05	-.02	-.03	-.02	1.00		
11.Marketing standardization	.16*	.08	-.02	.03	-.06	.01	-.06	.06	.12	.22**	1.00	
12.Technology standardization	.17*	.10	.06	-.01	-.02	.02	-.04	-.06	.05	.24**	.70**	1.00
Composite Reliability (CR)	-	-	-	-	-	-	-	-	.81	.85	.77	.60
Average Variance Extracted (AVE)	-	-	-	-	-	-	-	-	.59	.66	.77	.60

Note: All constructs were measured along seven-point Likert scales. Firm size is the natural log of the number of employees of the firms. Internationality of the firm was measured as the proportion of a firm's sales derived from operations outside the home country to total sales. Six industry dummies were created (dummy 1=computers, electrical and electronics, dummy 2=motor vehicles and other transport equipment, dummy 3=chemicals and chemical products, dummy 4=machinery and mechanical equipment, dummy 5=refined petroleum, rubber, and plastic products, and dummy 6=food, beverages, textiles, and paper products) with the metals and fabricated metal products industry acting as the base group.
* p < .05, ** p < .01, All significance tests are two-tailed.

Table 3 presents correlations, reliability (composite reliability), and validity (average variance extracted) of the constructs used in the study. The measures demonstrate adequate reliability and validity. The scale composite reliability for each construct was quite satisfactory (i.e., CRη values ranged from 0.60 to 0.85, exceeding the acceptable level of 0.70) (Fornell and Larcker, 1981). The AVE (average variance extracted) for each construct ranged from 0.59 to 0.77, exceeding the acceptable level of 0.50 (Fornell and Larcker, 1981). The results also showed that the shared variance between two constructs (i.e., squared correlation) is lower than each construct's AVE (Fornell and Larcker, 1981). Consequently, they are suggestive of discriminant validity. We also examined whether a single factor model ($\chi^2(22) = 490.15$) fits the data better than CFA model ($\chi^2(17) = 28.19$) (Brockman and Morgan, 2006). The difference in the chi-square statistic between the single factor model and the measurement model was significant (the change in χ^2 = 461.96,

the change in df = 5, p < 0.01). This result demonstrates that the probability of common method variance occurring is minimized and common method bias was not a serious problem in this study.

<Table 4> Regression Results

	Marketing Standardization, βa(t-value[1)], VIF)	
	Model a	Model b
Internationality	.229** (2.875. 1.374)	.198* (2.543. 1.396)
Firm size	.005 (.074, 1.168)	-.015 (-.214, 1.177)
Industry dummy 1	-.103 (-1.060, 2.052)	-.185† (-1.905, 2.170)
Industry dummy 2	-.011 (-.123, 1.682)	-.026 (-.304, 1.686)
Industry dummy 3	-.028 (-.306, 1.864)	-.040 (-.446, 1.868)
Industry dummy 4	.006 (.077, 1.507)	-.020 (-.239, 1.527)
Industry dummy 5	-.105 (-1.282, 1.461)	-.096 (-1.199, 1.475)
Industry dummy 6	.061 (.697, 1.645)	.367 (.714, 1.688)
Technology change		.233** (3.297. 1.149)
Competitive intensity		.134† (1.976, 1.061)
R^2	.053	.115
Adjusted R^2	.016	.071
$\triangle R^2$	.053	.062
F	1.446	2.639**

2. Hypotheses testing

Table 4 and 5 presents the results of regression analyses. Table 4 shows that technology change exhibited a significant, positive effect on marketing standardization (t = 3.297, P < .01). Thus, **H1a** was supported. The result (Table 4) also indicates that a higher level of competitive intensity was associated with a higher level of marketing standardization (t = 1.976, P < .10), supporting **Hypothesis 2a.**

1) [a] Standardized beta values are reported. † : Significant at p < .10, *: Significant at p < .05, **: Significant at p < .01, ***: Significant at p < .001

Table 5 shows that technology change exhibited a significant, positive effect on technology standardization (t = 3.560, P < .001). Thus, **H1b** was supported. However, the direct effect of competitive intensity on technology standardization was insignificant (β = .073, p = .287), failing support for **Hypothesis 2b.**

〈Table 5〉 Regression Results

	Technology Standardization, βa(t-value[2]), VIF)	
	Model a	Model b
Internationality	.172* (2.149. 1.374)	.138† (1.759. 1.396)
Firm size	.043 (.588, 1.168)	.027 (.371, 1.177)
Industry dummy 1	-.026 (-.264, 2.052)	-.110(-1.120, 2.170)
Industry dummy 2	-.044 (-.501, 1.682)	-.057 (-.663, 1.686)
Industry dummy 3	.004 (.044, 1.864)	-.005 (-.050, 1.868)
Industry dummy 4	-.019 (-.229, 1.507)	-.038 (-.460, 1.527)
Industry dummy 5	-.091 (-1.106, 1.461)	-.090 (-1.108, 1.475)
Industry dummy 6	-.059 (-.671, 1.645)	-.081 (-.943, 1.688)
Technology change		.254*** (3.560. 1.149)
Competitive intensity		.073 (1.067, 1.061)
R^2	.041	.101
Adjusted R^2	.004	.057
$\triangle R^2$	.041	.060
F	1.102	2.277*

Ⅴ. Conclusions

The study examined the influence of external environments such as technology change and competitive intensity on standardization. The empirical result confirms that technology change and competitive intensity increase the odds of marketing standardization and technology standardization

2) [a] Standardized beta values are reported. † : Significant at p < .10, *: Significant at p < .05, **: Significant at p < .01, ***: Significant at p < .001

and contributes to the literature on standardization. The results indicate that technology change and global standardization are related. The relationship between the rate of technology change and standardization is significant. The data support that firms facing a high rate of technology change stress marketing and technology standardization.

Although the empirical result confirms that competitive intensity directly influences marketing standardization, the results do not lend support to the proposed direct effect of competitive intensity on technology standardization. In the literature, the negative association of competitive intensity on standardization has been generally recognized (e.g., Cui and Lui 2005).

The theoretical framework and empirical results have also implications. In view of the influence of external environments on standardization, companies need to assess their external environments to implement global standardization. The study also has a number of limitations which should be taken on board when interpreting the findings. The results of this cross-sectional design and involving data where both independent and dependent variables have been gathered simultaneously at a given point of time need to be confirmed by longitudinal studies (Slater, 1995). Another limitation may be the cross-sectional sample, consisting of many industries. Although this enhances generalizability (Bello and Gilliland 1997; Morgan *et al.,* 2004), nevertheless, future testing of the model with a certain industry sample to confirm applicability is called for.

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국문초록

외부환경요인과 표준화에 관한 연구

이 건 봉*

본 연구는 표준화에 대한 기술변화 및 경쟁강도와 같은 외부환경요인들의 영향을 검증하였다. 연구프레임워크의 타당성에 대해 한국기업의 샘플을 통해 실증적으로 테스트하였다. 검증결과는 외부환경요인들이 마케팅표준화와 기술표준화의 가능성을 증가시킨다는 것을 확증하였다. 연구결과는 기술변화와 글로벌표준화간에 상관관계가 있음을 보여주고 있다. 즉, 데이터는 빠른 기술변화에 직면한 기업들이 마케팅과 기술의 표준화를 강조하고 있음을 지지하고 있다. 또한 실증적결과는 경쟁강도가 마케팅표준화에 직접적으로 영향을 주고 있음을 확인하여 주었다.

주제어 : 기술변화, 경쟁강도, 표준화

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