THE VIABILITY OF USING DIFFUSION PATTERNS FOR SEGMENTING INTERNATIONAL MARKETS: PROBLEMS AND PROSPECTS

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ABSTRACT

This paper examines the application of the diffusion of innovation paradigm as a country segmentation scheme in international marketing research. International diffusion is reviewed from both a modeling and classification perspective. Although marketers can gain valuable information by assessing international diffusion patterns, these patterns should not be the sole criteria used in segmenting international markets.

INTRODUCTION

One of the most widely used paradigms in marketing has been the diffusion of innovations. According to Rogers (1983), diffusion is "the process by which an innovation is communicated through certain channels over time among members of a social system" (p. 5). The diffusion perspective was introduced to the marketing literature in the mid-1960s (e.g., Arndt 1967; Robertson 1967). Marketers' interest in the diffusion of innovations stems from the inherent difficulty in getting a new product or service adopted, even if it appears to have obvious advantages. While marketing scholars have certainly contributed to the cumulative development of diffusion theory, the major focus has been on the application of the concept in situationally-specific marketing contexts (Gatignon and Robertson 1985). Nowhere is this more true than in the usage of the diffusion of innovations construct in an international context.

International marketing research on the diffusion of innovations has been relatively sparse to date (Gatignon, Eliashberg and Robertson 1989; Helsen, Jedidi and DeSarbo 1993). The concept of diffusion has been employed in these studies primarily as a tool for market segmentation. As suggested by Douglas and Craig (1992), an alternative to classifying countries using macro level variables is the notion of segmenting markets on the basis of aggregated new product diffusion patterns. Two segmentation applications of diffusion theory have been most commonly employed to date: (1) segmentation based on various modeling approaches for adoption rates (e.g., Takada and Jain 1991); and (2) segmentation using various classification approaches (e.g., Wills, Samli and Jacobs 1991). This article examines the use of the diffusion of innovations as a basis for international marketing segmentation typologies. Our objective here is three-fold: first, an overview of the incorporation of the diffusion framework into the international arena is provided; second, the prospects and problems associated with these applications is discussed; and finally the viability of using a diffusion pattern-based country segmentation framework is examined and suggestions for enhanced cross-cultural conceptualization are urged.

MODELING PATTERNS OF INTERNATIONAL DIFFUSION

The majority of the modeling efforts employed in the international setting have been variants of the classical Bass (1969) diffusion model. Bass' model proposes that the probability, P(t), of an initial purchase being made at time t, given that no purchase has been made is related linearly to the number of previous buyers. Mahajan, Muller and Bass (1990), in a comprehensive review of the diffusion literature, noted that the Bass model provides both a measure of external (due to mass media) and internal (due to personal communications) influences on the diffusion of innovations. Heeler and Hustad (1980) were among the first academics to assess the Bass model in an international setting. They evaluated the performance of the Bass model in terms of its ability to predict both the timing of the sales peak and its magnitude. Their overall results were rather

disappointing. Their results were constrained by unstable parameter estimates, poor data fit, and inaccuracies in sales peak magnitude predictions. As would be expected, Heeler and Hustad (1980) attributed these problematic findings to the differences in communication patterns and economic constraints in countries outside of the United States. The Bass model was developed based on U.S. domestic data, and there is always concern when expanding from the original locale used for the model's development. Heeler and Hustad also speculated that the poor fit of the Bass model might be attributable to the model's own inflexibility as well as the insufficient use of extended time series data in its application.

Gatignon, Eliashberg and Robertson (1989), in an attempt to address the lack of innovativeness overlap indicated by Gatignon and Robertson (1985), improved upon Heeler and Hustad's (1980) efforts by extending the Bass model from a simple time-series based estimation of the effects of the determinants of the diffusion parameters across both time periods and countries. They also disputed the notion of the existence of a lead-lag effect and asserted that innovations are diffused simulataneously in multiple countries rather than in a sequential pattern. Using European countries as the basis for analysis, the authors investigated the systematic patterns in cross-country diffusion processes and hypothesized that a country's cosmopolitanism, mobility, and gender roles would have an impact on the adoption of new products. Specifically, the authors found that: (1) a country's degree of cosmopolitanism was positively related to innovative propensity; (2) a country's population mobility was positively related to imitative propensity, and (3) the role of women in a country's labor force was innovation specific. Gatignon, Eliashberg and Robertson (1989) asserted that an examination of these variables would provide marketers with the ability to make forecasts based on experience before sales data were even available.

Takada and Jain (1991) applied the Bass model to the diffusion process of durables in Pacific Rim countries. They examined not only the rate of new product adoptions, but also the effect that a country's social system plays in the diffusion process. Specifically, Takada and Jain studied the role of high versus low cultural context (Hall 1976) and cultural communication style (heterophilous versus homophilous). They found that adoption rates were higher in countries characterized by high context culture and homophilous communications (e.g., Japan, South Korea) than in countries characterized by low context culture and heterophilous communications (e.g., the United States). Additionally, their results showed that the imitation coefficient in the Bass model was positively related to the time lag of product introduction between countries. This would seem to indicate that a product's diffusion process is likely to be faster in a foreign market than in that product's home market. Intuitively, this raises serious questions when considering inter-country cultural nuances.

Helsen, Jedidi and DeSarbo (1993) analyzed the diffusion patterns of various countries in order to discern whether macro-level country segmentation schemes were related to diffusion-based country groupings. They found that there was little congruence between the two approaches. Additionally, they found that certain country constructs, such as life style and health status, were positively related to innovative propensity. Helsen, Jedidi and DeSarbo also noted, however, that diffusion-based segments tended to be product-specific. Thus, countries which might be quick to adopt one product cannot be expected to be adoption-prone for other offerings.

In a recent study, Kalish, Mahajan and Muller (1995) examined the use of sequential market introduction (waterfall) strategies and simultaneous market introduction (sprinkler) strategies. Using a competitive game framework, they concurred with the earlier assertion of Gatignon, Eliashberg and Robertson (1989) that sprinkler strategies appear to be the best choice in the present global market. Kalish, Mahajan and Muller noted that waterfall strategies are not optimal due to the fact that: (1) most firms cannot achieve monopolistic power in foreign markets, (2) continued integration of markets has actually reduced the size of global markets, (3) global consumer segments have emerged, (4) product life cycles are shorter, and (5) world trade barriers have decreased.

CLASSIFICATION APPROACHES TO INTERNATIONAL DIFFUSION

Researchers who have employed classification or framework approaches to international

diffusion typically have not focused on a country's rate of adoption, but rather, have attempted to assess different countries' levels of innovativeness and opinion leadership. This approach has tended to focus on actual product ownership, rather than on the relative time of innovation adoption. Proponents of this method have argued that "at a given point of time, individuals who are typically the first to adopt will also have adopted more items" (Robertson 1971, p. 90).

In an early study from this perspective, Green and Langeard (1975) studied the adoption of various consumption goods and found that different countries varied in their use of word-of-mouth communications. They also noted that while innovators can be identified cross-culturally for some consumption categories, they cannot be identified for all categories.

Cosmas and Sheth (1980) examined the impact of opinion leadership characteristics on the diffusion of innovations and ideas. In their study of five cultural groups they found that people within and across cultures use basic dimensions, such as maturity, authoritarianism, etc., to evaluate their opinion leaders. They also found that different cultures applied varying degrees of importance to these basic dimensions and discovered that geographic proximity did not imply similarity. They posited the valuable tenet that cultural closeness may be the key. The authors concluded that since opinion leaders are so vital in the diffusion of new products, marketers should employ the use of opinion leaders in their promotions who epitomize those characteristics deemed to be important by the targeted culture.

The notion of a national innovativeness was investigated by Lee (1990). Lee found that determinants of national innovativeness were such variables as: (1) per capita GNP, (2) the proportion of manufacturing and service sectors over total GNP, (3) literacy rate, and (4) the proportion of scientists and engineers to the number of households. Based on these variables, the authors attempted to cluster countries into five groups matching Rogers' (1983) adopter categories. The country categories included: (1) innovators (i.e., Japan and the U.S.), (2) early adopters (i.e., Canada, Denmark, and West Germany), (3) the early majority (i.e., Australia, France, Singapore, and the United Kingdom), (4) the late majority (i.e., Argentina, Hungary, Thailand, and Turkey), and (5) the laggards (i.e., Algeria, China, India, Pakistan, and Syria).

Resistance to innovations has also been the focus of a few international diffusion studies. Researchers have found that resistance to innovations tends to vary across cultures depending upon whether or not a particular culture was tradition-bound (Sheth and Ram 1987; Ram 1989). These studies noted that tradition-bound cultures were more resistant to change. Ram (1989) contended that, when introducing a new product or innovation, marketers can use either one of two strategies: communication such as advertising (successful when there are high levels of social risk) or product modification (successful when the resistance is due to economic or performance risk). Sheth and Ram (1987) suggest that marketers can only develop strategies to reduce risk and increase new product adoption if cultural variables to resistance are known.

Tansuhaj et al (1991) examined the role of three culturally-specific variables on a culture's resistance or receptiveness to innovations: (1) fatalism (fate orientation -- all events predetermined by fate and thus unalterable by humans), (2) religious commitment, and (3) traditionalism. They found that the patterns of innovativeness and perceived risk across the countries were inconsistent and appeared to be product category dependent. They did find that people who were more likely to try new products also perceived less risk to be associated with them. They also noted that fatalism was the only one of the three measures to have an impact on willingness to try new products (e.g., fatalistic respondents were less willing to try new entertainment products because they perceived higher risk associated with them). They concluded that marketers should be aware of the impact of fatalism when marketing new products in new markets.

Wills, Samli and Jacobs (1991) proposed that "based on the varying speed of the diffusion process, marketing practitioners can make a significant impact on the adoption of the new products at the consumer level in different cultures" (p. 6). They proposed that both culture context and the diffusion rate will impact innovation acceptance in a market. In order to demonstrate this integration, Wills, Samli and

Jacobs developed a context/diffusion matrix. They used this matrix to classify countries and suggested specific marketing actions that should be used in the promoting of new products. For example, Wills, Samli and Jacobs recommended that countries with faster-than-average rates of diffusion and a high-context culture, such as Japan, should focus their marketing efforts on personal selling in well-known distribution centers and use price skimming strategies. Amine (1993), while not disputing the framework proposed by Wills, Samli and Jacobs (1991), disagreed with some of the marketing strategies suggested. In the high context/fast diffusion markets, for example, Amine argued that the use of personal selling is unnecessarily restrictive and markets in this segment could be more effectively served through targeted advertising at selected distribution points.

In a recent work, Herbig and McCarty (1993) posited that both culture and structure (e.g., size of market, economic incentives, and social rigidity) must be positively enacted in order to ensure innovation diffusion. They designed a four quadrant innovation matrix which can be used, not only to classify countries, but as a tool for strategic change. For example, Herbig and McCarty noted that countries with positive structure and culture, such as the United States, need to focus on the maintenance of a competitive spirit and should not rely on past successes. On the other hand, countries with both negative structure and culture, such as the republics of the former Soviet Union, must quickly and decisively change their economic and social shortcomings in order to prosper.

PROSPECTS AND LIMITATIONS OF THESE APPROACHES

The one thing that appears to be clear from the international application of diffusion pattern models is that diffusion theory predicts varying rates and patterns across countries. Gatignon and Robertson (1985) predicted this result and suggest that variations will always occur because of the differences in social system characteristics across borders. Jain, Mahajan and Muller (1989) even asserted that the Bass model may be inappropriate for application by international marketers because the supply of products are typically restricted. Although the results of the studies to date provide no clear model application that can be applied to all markets across all categories, they still provide useful information for international marketers. One of the key findings from this area of research is that a lead-lag effect exists in the adoption and diffusion of new products. Additionally, lead countries typically have slower diffusion rates than lag countries. Thus, marketers may have to position their offerings differently depending on their classification. Another important contribution, albeit inclusive, is that variables beyond pure product sales and economic status appear to play a role in the diffusion process. For example, a country's life style (Helsen, Jedidi and DeSarbo 1993), degree of cosmopolitanism (Gatignon, Eliashberg and Robertson 1989), and cultural communication style (Takada and Jain 1991) have all been demonstrated to have an impact on diffusion patterns. Finally, researchers have pointed out the need for employing simultaneous product introductions internationally or sprinkler strategies (Gatignon, Eliashberg and Robertson 1989; Kalish, Mahajan and Muller 1995). This is certainly an important notion for marketers since most international product introductions have typically followed a sequential country-to-country or waterfall strategy.

While the use of diffusion models in global marketing research can certainly provide marketers with worthwhile information, they cannot be considered a panacea. Marketers must be extremely cautious in applying these models in an international setting for several reasons. First, diffusion patterns lack stability from one product introduction to another. This makes it virtually impossible for marketers to accurately predict adoption patterns even among products in a similar product class. Second, the majority of studies conducted to date have focused on only one element of the marketing mix: the product. Assessment of a product in a vacuum without the corresponding price, promotion, and distribution elements, is unrealistic and myopic. Third, international marketing data lacks consistency and reliability. This creates some lack of confidence in the estimates and projections we can make from these models. Finally and most importantly, modeling approaches to diffusion theory tend to be post-dictive rather than predictive. Additionally, environmental variables that may provide explanatory power are typically not inherent in these models. Although the explanation of past behaviors and trends is of some value to

marketers, we cannot assume that previous adoption rates are indicative of future ones. In essence, time-of-adoption methods cannot be used to predict future behavior (Goldsmith and Hofacker 1991). Even though this has been seen as a minority opinion in the diffusion literature, this potential limitation is significant and should be a focus for future research efforts.

The classification approaches to diffusion also provide marketers with valuable intelligence when operating in a global environment. One clear finding is that countries vary in their degree and propensity of innovativeness. Thus, if marketers employ sprinkler strategies, they must keep in mind that marketing mix variables, especially promotion and distribution aspects, may need to be adjusted depending upon a country's level of innovative behavior. While some of the classification approaches discussed may have intuitively pleasing qualities, it should be noted that they are highly subjective and situationally specific. Although some of the matrix and framework depictions are easy-to-understand pedagogical tools, they lack operationalization in a real-world marketing context. Other classification approaches are more cross-sectional in nature and rely on actual product purchases as measures of innovativeness. Although some may argue that this a better measure of innate innovativeness, research findings have shown that there is little if any overlap of innovativeness across product categories (Gatignon and Robertson 1985).

One final caution may be the most important and limiting of all: diffusion is a process which originally was developed and modeled from only one limited perspective - that of the United States. It stands to reason that the data used for model development would have culturally-specific limitations associated with it. While there have been attempts to extend diffusion models into different countries and cultural settings, the basic premise was developed from a U.S. perspective and may be limited in its applicability as conceptualized. Have the results of model employment across cultures been because actual differences were appropriately identified, or were the differences brought about as a result of a set of model assumptions which did not hold up in cross-cultural applications? It is possible that models of diffusion developed from other-country data and perspectives could produce different functional relationships. We must be careful of cultural myopia and international opportunistic expansion in Marketing modeling. Anything developed from a Western mind set and data could be questioned when taken into Asian countries, or into less-developed countries in Latin America and Africa.

THE VIABILITY OF DIFFUSION PATTERN-BASED COUNTRY SEGMENTATION

Marketers have certainly come to realize the importance of a thorough understanding of which behaviors and attitudes change at national boundaries, and which remain relatively stable. While country segmentation may offer some valuable insights (e.g., Jain 1993), some researchers have disputed its appeal for international marketing practitioners. Cavusgil and Nevin (1981) pinpoint potentially serious limitations, such as the absence of data, reliance on aggregate data, and lack of validity in partitionings over time. The use of such macro-level variables for international segmentation and classification schemes may indeed be questionable when one examines the rather heterogeneous nature of the products and services typically involved in global business activities. In addition, this approach assumes that a country is a homogeneous unit (Jain 1993). Most marketers have come to realize that there are certainly distinct segments within countries and, more importantly, segments which may be common across countries (Kale and Sudharshan 1987).

In addition to the problems with country segmentation in general, there are also difficulties specific to segmenting countries based on diffusion patterns. One of the major problems with the diffusion-based country segmentation approach is that the results have been consistently inconsistent. The use of different variables, measurement schemes, and products provide country groupings which change from study to study. Additionally, although the diffusion of innovations has certainly had a significant impact to the understanding and explaining of consumer behavior, it lacks the ability to predict and control outcomes (Onkvisit and Shaw 1989). No causal link has been developed which proves a relationship between the rate of adoption for one product and the rate of adoption for another product (the diffusion modeling perspective). Nor has the notion of innovativeness been proven to exist across product categories (the categorical

approach). As previously mentioned, it is intuitively logical to question the applicability of a process which was conceptualized and modeled from a single-country perspective. It may be a self-fulfilling prophecy that International Marketers have reported conflicting results using diffusion as a classification vehicle. Thus, accurate strategic decisions may not be possible with such general or macro-level segmentation schemes whose underlying taxonomy may have little effect in explaining or describing differences in specific new product/service diffusion rates (Helsen, Jedidi and DeSarbo 1993). It would seem that if diffusion could be studied and modeled in different countries and across different cultures simultaneously, there may be both consistencies across models and situation-specific aspects which could be identified which could help explain the appropriateness of diffusion as a classification vehicle in a multicultural setting more effectively than using the limited framework we now have at our disposal. As a final point, we do not want to suggest that diffusion modeling as a research focus is not viable. Rather, we are concerned that culture-specific dimensions have not been sufficiently incorporated into the diffusion models as presently conceptualized and applied; thus, making the use of these models for country segmentation is limited.

REFERENCES

Amine, Lyn S. 1993. "Linking Consumer Behavior Constructs to International Marketing Strategy: A Comment on Wills, Samli, and Jacobs and an Extension." *Journal of the Academy of Marketing Science* 21 (1): 71-77.

Arndt, Johan. 1967. "Role of Product-Related Conversation in the Diffusion of a New Product." *Journal of Marketing Research* 4: 291-295.

Bass, Frank M. 1969. "A New Product Growth Model for Consumer Durables." *Management Science* 15 (January): 215-227.

Cavusgil, S. Tamer and J.R. Nevin. 1981. "State-of-the-Art in International Marketing: An Assessment." in *Review of Marketing 1981*, B. Enis and K.J. Roering, eds. Chicago: American Marketing Association, 195-216.

Cosmas, Stephen C. and Jagdish N. Sheth. 1980. "Identification of Opinion Leaders Across Cultures: An Assessment for Use in the Diffusion of Innovations and Ideas." *Journal of International Business Studies*, 11 (Spring/Summer): 66-73.

Douglas, Susan P. and C. Samuel Craig. 1992. "Advances in International Marketing." *International Journal of Research in Marketing* 9 (December): 291-318.

Gatignon, Hubert, Jehoshua Eliashberg and Thomas Robertson. 1989. "Modeling Multinational Diffusion Patterns: An Efficient Methodology." *Marketing Science* 8 (Summer): 231-247.

Gatignon, Hubert and Thomas S. Robinson. 1985. "A Propositional Inventory for New Diffusion Research, *Journal of Consumer Research* 11 (March): 849-867.

Goldsmith, Ronald E. and Charles F. Hofacker. 1991. "Measuring Consumer Innovativeness." *Journal of the Academy of Marketing Science* 19 (Summer): 209-221.

Green, Robert T. and E. Langeard. 1975. "A Cross-national Comparison of Consumer Habits and Innovator Characteristics." *Journal of Marketing* 39 (July): 34-41.

Heeler, Roger M. and Thomas P. Hustad. 1980. "Problems in Predicting New Product Growth for Consumer Durables." *Management Science* 26 (October): 1007-1020.

Helsen, Kristiaan, Kamel Jedidi, and Wayne S. DeSarbo. 1993. "A New Approach to Country Segmentation Utilizing Multinational Diffusion Patterns." *Journal of Marketing* 57 (October): 60-71.

Herbig, Paul A. and Cynthia McCarty. 1993. "The Innovation Matrix." *Journal of Global Marketing* 6 (4): 69-87.

Jain, Dipak C., Vijay Mahajan and Eitan Muller. 1989. "Innovation Diffusion in the Presence of Supply Restrictions." working paper, Cox School of Business, Southern Methodist University.

Jain, Subhash C. 1993: *International Marketing Management*, 4th ed. Boston: PWS-KENT Publishing Company.

Kale, Sudhir H. and D. Sudharshan. 1987. "A Strategic Approach to International Segmentation." *International Marketing Review* 3 (Summer): 60-70.

Kalish, Shlomo, Vijay Mahajan and Eitan Muller. 1995. "Waterfall and Sprinkler New Product Strategies in Competitive Global Markets." *International Journal of Research in Marketing* 12: 105-119.

Lee, Chol. 1991. "Determinants of National Innovativeness and International Market Segmentation." *International Marketing Review* 7 (5): 39-49.

Mahajan, Vijay, Eitan Muller and Frank M. Bass. 1990. "New Product Diffusion Models in Marketing: A Review and Directions for Research." *Journal of Marketing* 54 (January): 1-26.

Onkvisit, Sak and John J. Shaw. 1989. "The Diffusion of Innovations Theory: Some Research Questions and Ideas." *Akron Business and Economic Review* 20 (Spring): 46-55.

Ram, S. 1989. "Successful Innovations Using Strategies to Reduce Consumer Resistance: An Empirical Test." *Journal of Product Innovation Management* 6 (20): 20-34.

Rogers, Everett M. 1983. *Diffusion of Innovations*, New York: The Free Press.

Robertson, Thomas S. 1967. "The Process of Innovation and the Diffusion of Innovation." *Journal of Marketing* 31 (January): 14-19.

Robertson, Thomas S. 1971. *Innovative Behavior and Communication*, New York: Holt, Rinehard and Winston.

Sheth, Jagdish N. and S. Ram. 1987. *Bringing Innovation to Market: How to Break Corporate and Customer Barriers*, New York: John Wiley and Sons.

Takada, Hirokazu and Dipak Jain. 1991. "Cross-National Analysis of Diffusion of Consumer Durable Goods in Pacific Rim Countries." *Journal of Marketing*,55 (April): 48-54.

Tansuhaj, Patriya, James W. Gentry, Joby John, L. Lee Manzer and Bong Jin Cho. 1991. "A Cross-national Examination of Innovation Resistance." *International Marketing Review* 8 (September): 7-20.

Wills, James, A. Coskun Samli, and Laurence Jacobs. 1991. "Developing Global Products and Marketing Strategies: A Construct and a Research Agenda." *Journal of the Academy of Marketing Science* 19 (1): 1-10.