A Cross-Cultural Investigation of New Product Strategies for Technological and Design Innovations

David A. Griffith and Gaia Rubera

ABSTRACT

Although design and technological innovations are conceptually distinct and require significantly different resource investments by the firm, little is known about how differing strategies employed in relation to these new products influence changes in market share across national cultures. In this study, the authors provide insights into how technological and design product innovations and product portfolio breadth strategies influence changes in market share within 26 technological and 12 design innovations across 17 firms operating in eight European countries. The results indicate that the positive effect of design innovation on changes in market share strengthens as individualism and indulgence increases, whereas the positive relationship between technological innovations and market share is weakened as uncertainty avoidance and indulgence increase. In addition, the positive relationship between design product portfolio breadth strategies and changes in market share is strengthened as individualism and indulgence increase but is weakened as uncertainty avoidance increases, whereas the positive relationship between technological product portfolio breadth and changes in market share is strengthened as individualism increases. The authors discuss the theoretical and managerial implications of the findings.

Keywords: innovations, technological innovations, design innovations, product portfolio breadth, cross-cultural

Technological and design innovations (i.e., introduction of a new product technology or design into a given market) are becoming increasingly important when competing in the global marketplace (Sun and Lee 2013). For example, PC makers have found that to engage consumers, they must move beyond technological innovations and focus on product design innovations (Newman 2013). As such, PC makers carefully consider the type of innovations offered within each market in relation to their overall product portfolio. Similarly, those in the peripheral market have found that technological and design innovations are central to gaining market share. For example, California-based Logitec, a world leader in computer peripherals, was unable to gain a foothold in the Chinese marketplace, ceding significant market share to China-based Rapoo. Only when Logitec focused on introducing new products into the market with technological and design advantages over Rapoo was it able to gain substantial market share (Govindarajan and Trimble 2012).

These examples demonstrate the importance of technological and design innovations as competitive strategy, but research efforts have primarily focused on the effects of firm introductions of technological innovations (e.g., Chandrasekaran and Tellis 2008; Filipescu et al. 2013). The primary focus on technology is worrisome because design is distinct (Creusen 2011; Newman 2013; Rubera, Griffith, and Yalcinkaya 2012) and not necessarily predetermined by technology. Technological innovation refers to changes in the functionalities of the product, whereas

David A. Griffith is Department Chair and Professor of Marketing, Department of Marketing, College of Business and Economics, Lehigh University (e-mail: david.a.griffith@lehigh.edu). **Gaia Rubera** is Associate Professor, Department of Marketing, Bocconi University (e-mails: gaia.rubera@unibocconi.it).

Journal of International Marketing

Vol. 22, No. 1, 2014, pp. 5–20
ISSN 1069-0031X (print) 1547-7215 (electronic)

design innovation refers to changes in the external appearance of the product (Hoegg and Alba 2011; Rubera and Droge 2013). Although product innovations typically incorporate both technological and design aspects, they often heavily emphasize one over the other. As such, many new products can be characterized as primarily technological or design innovations (for simplicity, we use the terms "design innovation" and "technological innovation" as representative of the dominant new product element throughout the work and theorize on this basis).

Conceptually, technological and design product innovations differ in three ways, which suggests the need to treat them separately both theoretically and managerially. The first difference pertains to product diffusion. Technological innovation is typically internal to the product form and therefore is less observable, whereas design innovation involves a product's external appearance and thus is more observable (Rindova and Petkova 2007). As a direct consequence, the diffusion of technological innovation occurs primarily through verbal influence (Gatignon and Robertson 1985), whereas design innovation diffuses through both visual and verbal influence (Bass 1969). The second difference involves the type of risk in the adoption of an innovation (Midgley 1983). A technological innovation generates performance risk (i.e., Will the technology work properly?), whereas a design innovation generates social risk (i.e., Will a social group accept the product's design?) (Eisenman 2009). Differences in risk associated with each innovation type influence its adoption. The third difference pertains to the needs the innovation satisfies. By changing product functionalities, technological product innovations address prevention needs, such as the desire to behave in a safe and secure way, be responsible, and avoid loss (Molden, Lee, and Higgins 2008). Alternatively, design product innovations address promotion needs, such as the desire to separate oneself from others (Chitturi, Raghunathan, and Mahajan 2007), often generating positive emotional states (Molden, Lee, and Higgins 2008). These differences between technological and design product innovations provide the theoretical rationale (i.e., observability, risks, and need satisfied) for understanding the differential effects across new products. More important, prior research has highlighted differential effects across national cultures in relation to observability, risks, and needs satisfied (e.g., Hofstede 2001; Van den Bulte and Stremersch 2004), and therefore understanding the global marketing implications of technological and design innovations is crucial.

Given the distinctions between technological and design innovations and the potential for differences in performance outcomes associated with these innovation types across national cultures, the lack of work in this area creates a theoretically and managerially important gap. The current work attempts to help fill this gap, thus contributing to the international marketing strategy literature in two ways. First, we extend the theoretical work on how national culture influences technological innovations (e.g., Chandrasekaran and Tellis 2008) by developing a rationale for how three theoretically meaningful cultural dimensions (i.e., uncertainty avoidance, individualism, and indulgence) affect the effectiveness of technological and design innovations on changes in firm market share. The results indicate that the positive effect of design innovation on changes in market share strengthens as individualism and indulgence increase, whereas the positive relationship between technological innovations and changes in market share is weakened as uncertainty avoidance and indulgence increase. Because firms are challenged to decide whether to invest resources for the development of technological or design innovations (Rubera and Droge 2013; Talke et al. 2009), these findings provide clarity on the effectiveness of investments in such innovations across national cultures.

Second, product innovations occur within a firm's overall portfolio of products, and thus we extend the literature by examining the effects of a firm's technological and design product portfolio breadth on market share across national cultures. Product portfolio breadth refers to the firm's coverage of the types of technologies and design offerings available in the market (Caves and Ghemawat 1992; Fernhaber and Patel 2012; Galbraith and Schendel 1983). The findings indicate that the positive relationship between design product portfolio breadth strategies and market share is strengthened as individualism and indulgence increase but is weakened as uncertainty avoidance increases, whereas the positive relationship between technological product portfolio breadth and changes in market share is strengthened as individualism increases. The identification of these effects helps fill an important gap in the literature and provides substantive guidance to international marketing managers.

We begin this work by briefly reviewing three literature streams—technological and design product innovations, product portfolio breadth, and national culture—that form the foundation of the hypotheses. Then, we formally develop a set of hypotheses. We test our hypotheses with a data set consisting of 26 technological and 12 design innovations across 17 firms operating in eight

European countries from 2000 to 2007. Next, we discuss the theoretical and managerial implications of this work. We conclude by discussing the limitations of the study and offering directions for further research.

BACKGROUND LITERATURE

Technological and Design Innovations

Product innovation is critical for a firm's survival and success in today's global marketplace (Lee and Zhou 2012; Rubera and Kirca 2012). Innovation refers to any introduction of a new technology or design into a given market, regardless of how incremental. Prior research has demonstrated that the introduction of product innovations, whether radical or incremental, positively influence firm value by increasing market share (Rubera and Kirca 2012).

Technological and design innovations offer consumers new options in the marketplace. Innovations typically surpass old technological or design standards and therefore offer consumers the opportunity to enhance their capabilities to accomplish tasks or enhance social status (i.e., by being innovators in the marketplace). In addition, when information about a product innovation is transferred between innovators and imitators (through visual and verbal communication), perceived risk decreases as the product innovation diffuses to other consumers in the society (Van den Bulte and Stremersch 2004). Furthermore, innovations deviate from extant standards. Deviance from a traditional external appearance of a product in a category (i.e., a design innovation) generates high excitement, interest, and willingness to search for information on that product, stimulating product trial (Rubera and Droge 2013). Although deviations in technology produce advanced product functionality, providing consumers greater capabilities, such innovations can sometimes create frustration in product use (e.g., difficulties in learning new technologies) (Mick and Fournier 1998). Because deviations in technology and design provide new opportunities for consumers to achieve greater efficiency and social status, firms experience market share gains from the introduction of design and technology innovations.

Technological and Design Product Portfolio Breadth

Product portfolio breadth reflects the firm's coverage of the types of offerings available in the market (Caves and Ghemawat 1992; Fernhaber and Patel 2012). Given that at a certain time (i.e., a year) there is a market for a specific number of different technologies, when determining the breadth of its product portfolio, a firm strategically decides whether to offer all of the technologies existing in the market or just a subset of those technologies. Similarly, given that at a certain time (i.e., a year) there is a market for a specific number of different designs, when determining the breadth of its product portfolio, a firm strategically decides whether to offer all of the designs existing in the market or just a subset of those designs.

Technological breadth (i.e., offering a greater number of technologies) enables a firm to strategically determine whether to serve heterogeneous groups of customers, including extremely innovative consumers eager to have the newest (usually superior) technology and consumers satisfied with technologies offering prior levels of performance (Bordley 2003), or more homogeneous groups of customers (e.g., offering a fewer number of technologies for fewer customer segments). Firms with broad technological product portfolio breadth reduce their overall risk by providing consumers with a variety of performance offerings from which to choose (i.e., from new unproven technologies to more established and well-tested technologies). Similarly, offering a broad variety of product forms through design breadth enables the firm to serve heterogeneous groups of consumers. However, because design innovations are more visible than technological innovations, increased breadth may postpone the emergence of a unique, "socially acceptable" design, thereby increasing consumer social risk when purchasing the firm's products (Djelic and Ainamo 2005). Therefore, broader offerings (technological or design) give the firm greater opportunities to satisfy a heterogeneous marketplace, in turn enabling it to increase its market share.

The Role of National Culture

National culture refers to the homogeneity in characteristics of a society's profile (e.g., norms, values, institutions). Research indicates that national culture can significantly influence innovation success (Chandrasekaran and Tellis 2008; Dwyer, Mesak, and Hsu 2005; Lee, Trimi, and Kim 2013; Rubera, Griffith, and Yalcinkaya 2012; Tellis, Stremersch, and Yin 2003). To better understand the specific effects of national culture, we adopt Hofstede's (e.g., Hofstede 2001; Hofstede, Hofstede, and Minkov 2010) cultural approach. We adopt this framework for two reasons. First, Hofstede's value-based orientation is directly related to the attitudinal

and behavioral factors influencing the purchase decisions of innovations (e.g., risk, need satisfaction). Our theoretical arguments underscoring innovation-type differences are directly related to Hofstede's cultural dimensions (e.g., uncertainty avoidance, individualism, indulgence). Second, prior research exploring national culture influences in marketing has theoretically applied Hofstede's value-based orientation (e.g., Chandrasekaran and Tellis 2008; Lee, Trimi, and Kim 2013). Consistent with Hofstede's (2001) work and previous product innovation research (e.g., Chandrasekaran and Tellis 2008; Lee, Trimi, and Kim 2013; Rubera, Griffith, and Yalcinkaya 2012; Tellis, Stremersch, and Yin 2003), we employ culture at the nation-state level to link national culture to country.

While providing a broad set of cultural dimensions, Hofstede (1983) also notes that researchers should specify and focus on the most theoretically appropriate dimensions of culture related to a phenomenon rather than attempting to relate all cultural dimensions. Consistent with this recommendation, the philosophy of parsimony in the theoretical explication of the relationships under study, and prior research in the field of international marketing (e.g., Engelen and Brettel 2011; Tellis, Stremersch, and Yin 2003), we investigate the cultural values that are theoretically most relevant to design and technological innovations and product portfolio breadth, in relation to the type of communication among members of a society, the nature of risk (i.e., performance and social), and the needs satisfied (i.e., prevention and promotion). As such, we investigate the effects of uncertainty avoidance, individualism, and indulgence (Hofstede, Hofstede, and Minkov 2010).

Uncertainty avoidance refers to how a culture manages an uncertain future (Hofstede 2001; Inkeles and Levinson 1969). Cultures high in uncertainty avoidance attempt to formulate ways to control future events, thus reducing uncertainty and risk, through planning, technology, religion, or other methods (Hofstede 2001; Inkeles and Levinson 1969). Uncertainty avoidance determines a culture's reaction to the risk embedded in innovations (Chandrasekaran and Tellis 2008). Individualism refers to the strength of relationships between members of a culture. People in individualist cultures prefer to act as individuals rather than as a cohesive group and work toward separating themselves from others, whereas those in collectivist cultures work toward interdependence (Hofstede 2001). Thus, individualism determines both the kinds of goals consumers strive to satisfy through the purchase of products (Steenkamp, Ter Hofstede, and Wedel 1999) and the importance of interactions between members of a society (i.e., value orientation toward social risk). Indulgence reflects whether societies allow for gratification of basic and natural human drives related to enjoying life and having fun (Hofstede, Hofstede, and Minkov 2010). Indulgence and restraint anchor this dimension. Whereas indulgent societies have a tendency toward desire gratification, societies with more restraint tend to adhere to relatively strict social norms that curb such gratifications. Thus, indulgence reflects the value underlying consumers' attitudes toward the role of products (i.e., risk) and products' relationship to individuals and society (i.e., needs).

HYPOTHESES

Product Innovations and National Culture Effects on Changes in Market Share

An innovation is successful if it can satisfy consumer needs better than existing products and if early adopters can rapidly transfer information to later adopters (Van den Bulte and Stremersch 2004). Research has demonstrated that the introduction of product innovations positively influences firm value (Rubera and Kirca 2012). Of interest to international marketers is whether aspects of national culture moderate this positive relationship between product innovation and market share, thereby providing marketing managers with differential effects in their global marketing efforts.

Cultures high in uncertainty avoidance formulate laws, rules, and norms to protect individuals from harm. Thus, consumers in such societies place significant emphasis on limiting performance risk. Regarding product innovation types, prior research has demonstrated that consumers in cultures high in uncertainty avoidance are reluctant to buy technological innovations because they raise uncertainty (Chandrasekaran and Tellis 2008). The logic underlying this is that technological innovations generate performance risk, which reduces adoption, thereby lessening the positive effect of such innovations on market share gains. Alternatively, design innovations do not increase performance risk. Although social risk may arise from design innovations, Hofstede (2001) argues that cultures high in uncertainty avoidance work to express emotions. Because design is directly related to emotions, such as delight (Chitturi, Raghunathan, and Mahajan 2007), owning new designs enhances the upside social benefit. Therefore, we contend that the positive effect of innovation on market

share will weaken with technological innovations but strengthen with design innovations. Thus:

H_{1a}: As uncertainty avoidance increases, the positive relationship between technological innovation introductions and market share is weakened.

H_{1b}: As uncertainty avoidance increases, the positive relationship between design innovation introductions and market share is strengthened.

Consumers in more individualist cultures strive for social differentiation (Hofstede 2001), achievable through innovations. We theorize that consumers in more individualist cultures are more receptive to both technological and design innovations because these innovations allow them to separate themselves from others. For example, given their high observability, design innovations provide buyers with visual cues that clearly signal their distinctiveness to others (Chitturi, Raghunathan, and Mahajan 2007). Similarly, technological innovations are communicated verbally in a market, providing distinctiveness. As such, we argue that as individualism increases, the positive effect of both design and technological innovation on market share is strengthened. Thus:

H_{2a}: As individualism increases, the positive relationship between technological innovation introductions and market share is strengthened.

H_{2b}: As individualism increases, the positive relationship between design innovation introductions and market share is strengthened.

As indulgence increases, the positive effect of design innovations on market share is strengthened, whereas it is weakened for technological innovations. Countries with high indulgence allow for gratification related to enjoying life, having fun, and satisfying desire, whereas cultures with more restraint limit the satisfaction of such gratifications (Hofstede, Hofstede, and Minkov 2010). Gratifications of desire and enjoyment of life are consistent with design innovations, which often contain novelty and creativity. Alternatively, although technological innovations advance product functionality, providing consumers with greater capabilities, they can also increase frustration in product use (Mick and Fournier 1998), limiting enjoyment. For example, new product functionalities often require substantive learning for effective product use, which often limits consumers' use of all the product's functions. Thus:

H_{3a}: As indulgence increases, the positive relationship between technological innovation introductions and market share is weakened.

H_{3b}: As indulgence increases, the positive relationship between design innovation introductions and market share is strengthened.

Product Portfolio Breadth and National Culture Effects on Changes in Market Share

A product portfolio breadth strategy is successful if it enhances the firm's value offering in the marketplace (Caves and Ghemawat 1992; Girotra, Terwiesch, and Ulrich 2007). As we noted previously, consumers in cultures high in uncertainty avoidance attempt to formulate ways to reduce uncertainty and risk, through planning, technology, religion, or other methods (Hofstede 2001; Inkeles and Levinson 1969). Broad technological portfolio breadth reduces performance risk because it allows consumers to choose from both newer and older technologies. In this way, the firm can capture multiple consumer segments. As such, the positive relationship between technological product portfolio breadth and market share is strengthened. While a broad design product portfolio allows a firm to offer products to a wide range of consumers, it also increases social risk of adoption because many different product forms in a market delay the emergence of a unique, socially acceptable standard. As such, the positive relationship between design product portfolio breadth and market share is weakened. Thus:

H_{4a}: As uncertainty avoidance increases, the positive relationship between technological product portfolio breadth and market share is strengthened.

H_{4b}: As uncertainty avoidance increases, the positive relationship between design product portfolio breadth and market share is weakened.

We further argue that more individualist cultures are favorably disposed toward technological and design product portfolio breadth. Technological product portfolio breadth provides consumers with an extensive array of technologies in the marketplace at one time. As such, performance risk is minimized because consumers can purchase prior technologies while trying new tech-

nologies. In this way, technological product portfolio breadth allows consumers who want to purchase new technologies to signal their individuality in doing so while also satisfying consumers who want to retain older technologies. Similarly, design product portfolio breadth provides consumers with a wide variety of options to signal their identity to others (Berger and Heath 2007). With broader product design breadth, firms enable customers to differentiate themselves while also allowing them to purchase more accepted designs. As such, the positive relationship between technological and design product portfolio breadth and market share is strengthened. Thus:

H_{5a}: As individualism increases, the positive relationship between technological product portfolio breadth and market share is strengthened.

H_{5b}: As individualism increases, the positive relationship between design product portfolio breadth and market share is strengthened.

We also argue that as indulgence decreases (restraint increases), the positive effects of both technological and design product portfolio breadth on market share will strengthen. As indulgence decreases, societal members act more responsibly and within the social conventions of society (Hofstede, Hofstede, and Minkov 2010). When firms offer broader technological product portfolio breadth, they offer diversity in product functionalities. Because technological innovation addresses prevention needs, which include the desire to behave in a safe and secure way and be responsible (Chitturi, Raghunathan, and Mahajan 2007), firms offering a broad technological product portfolio will be more aligned with the values of consumers in low indulgence cultures than firms offering greater design product portfolio breadth. Alternatively, as indulgence increases, the positive effect of design product portfolio breadth will strengthen. The logic underlying this is that greater design product portfolio breadth enables the firm to satisfy the promotion needs of consumers more fully than a more restricted design product portfolio would afford. Thus:

H_{6a}: As indulgence increases, the positive relationship between technological product portfolio breadth and market share is weakened.

H_{6b}: As indulgence increases, the positive relationship between design product portfolio breadth and market share is strengthened.

THE DATA SET

Description

We collected information on all mobile phones introduced in eight European countries (i.e., Belgium, France, Germany, Italy, the Netherlands, Spain, Sweden, and the United Kingdom) from 2000 to 2007. The data provide a unique context for investigating the hypotheses because (1) the mobile phone industry is characterized by many relevant design and technological innovations; (2) the industry is relatively young, enabling investigation of its significant life span (e.g., the International Telecommunication Union [2013] estimates that adoption of cell phones in 1997 averaged only approximately 18% in developed countries, compared with almost 90% in 2012); and (3) its oligopolistic nature makes this industry an ideal setting for examining whether differences in market share of the same firm across national cultures are due to the firm's design and technological strategies.

We used multiple sources to construct the database. We sourced Global Market Information Database and DataMonitor for market share data. We collected cell phone data in each market through Alatest.com, a website developed by International Consumer Services Sweden AB. For each cell phone in the database, Alatest provided information on the month and year in which the phone was introduced. The data contain 109 firm-country observations and eight time periods.

Measures

Change in Market Share. As mentioned previously, we collected data from Global Market Information Database and DataMonitor for each company in each country from 1999 to 2007.[1] We collected company market share on a per-country basis. We measured change in market share as market share at time t less market share at time t – 1.

Product Innovations. We conceptualize product innovation as the introduction of a new technology or design into a given market. We assessed all product innovations in terms of whether they were technological or design innovations. Table 1 presents the design and technological innovations during the study period. Categorization as technological and design innovations was based on changes in product functionality (i.e., technological) and form (i.e., design). Overall, our database contains 26 technological innovations. We constructed our measure of technological innovator as the count of all the technological innovations in which

Table 1. Design and Technological Innovations in Sample

Type of Innovation	Category
Design innovation	Convertible filter
	Dual slider
	Flip
	Flip-down microphone
	Folder-type phone
	Iconic revolving
	Rotating folder-type phone
	Sidekick
	Slider
	Swivel
	Twist on
	X2type (cross-to-type)
Technological Innovations	
Standby innovation (Battery life when the phone is not active)	At least 150 hours
	At least 200 hours
	At least 240 hours
	At least 270 hours
	At least 300 hours
Talk time innovation (Length of time a cell phone can be engaged in transmission before running out of power)	At least 180 minutes
	At least 215 minutes
	At least 240 minutes
	At least 300 minutes
	At least 400 minutes
	At least 540 minutes
Technology	GSM
	GSM/GSM PRO
	CDMA2000 1X
	CDMA2000 1X/AMPS
	CDMA2000 1X/GSM
	CDMA/AMPS
	AMPS/D-AMPS
	WDCMA (UMTS)/GSM
	IDEN/GSM
	iDEN
Wireless interface	Bluetooth
	Bluetooth 2.0
	Bluetooth 2.0 EDR
	Bluetooth(A2DP)
	Infrared(IrDA)

Notes: GSM = global system for mobile communications.

a company f had been the innovator in year j in country c (ranges from 0 to 5). Twelve design innovations occurred in the countries in our sample between 2000 and 2007; not all design innovations were introduced in all countries. Alatest provided the month and year of introduction of each cell phone, which enabled us to identify the first company to introduce the specific design innovation in each country and category. This variable ranged from 0 to 3, with 3 representing an exception: only Samsung introduced three design innovations in a single country in 2007.

Product Portfolio Breadth. For product portfolio breadth, a firm strategically decides whether to offer all the T technologies existing in the market or just a subset t < T. We define technological product portfolio breadth as the number of technologies firm f offers in year j. We constructed our measure of technological product portfolio breadth as the count of all the technological categories that a firm f provides in country c in year j, divided by the total number of T technological categories offered in country c in year j. Our measure of technological product portfolio breadth is $TB_{fcj} = (t_{fcj}/T_{cj})$. Similarly, a firm strategically decides whether to offer all the D designs existing in the market or just a subset d < D. We define design product portfolio breadth as the number of designs firm f offers in year j. We constructed our measure of design product portfolio breadth as the count of all the design categories that a firm f provides in country c in year j, divided by the total number of D design categories offered in country c in year j. Our measure of design product portfolio breadth is $DB_{fcj} = (d_{fcj}/D_{cj})$.

National Culture. We conceptualize national culture as the homogeneity in a society's profile of characteristics (e.g., norms, values, institutions) (Hofstede 2001). Consistent with prior research (e.g., Chandrasekaran and Tellis 2008; Lee, Trimi, and Kim 2013; Rubera, Griffith, and Yalcinkaya 2012; Tellis, Stremersch, and Yin 2003), we operationalized national culture using Hofstede's index scores. In particular, we sourced index scores for the cultural variables of uncertainty avoidance, individualism, and indulgence from Hofstede (2001) and Hofstede, Hofstede, and Minkov (2010).

Control Variables. To minimize spuriousness of the results, we added several control variables to the model. Because past reputation induces a firm to leverage innovations to gain market share, we controlled for past technological and design reputation. We measured technological (design) reputation as the number of previous technological (design) innovations firm f introduced in country c in the preceding years. We standardized this variable by the number of years the firm has been in operation in the country, to account for the idea that as time passes, firms are more likely to introduce more technological (design) innovations. We controlled for

firm assets, because more assets would provide more resources to leverage innovation and promotional efforts, and firm size, which we measured as the logarithm of the number of employees.

ANALYSIS AND RESULTS

Hierarchical Linear Modeling

We employed hierarchical linear modeling, which accounts for the lack of independence across cases (Bryk and Raudenbush 1992). We adopted an incremental model-building approach, which allows for sequential model testing. To estimate our models, we used Proc Mixed in SAS and employed a restricted maximum likelihood estimation, which is preferable to a maximum likelihood approach when the number of level-two units (in our case, countries) is small (Bryk and Raudenbush 1992). Random or fixed effects can be tested by comparing the deviance (–2 log-likelihood criterion) between two nested models. We included variables at two levels: firm (i.e., technological innovation [TI], design innovation [DI], technological product portfolio breadth [TB], and design product portfolio breadth [DB]) and country (i.e., uncertainty avoidance [UA], individualism [IND], and indulgence [INDUL]), plus the cross-level interaction effects. For ease of exposition, we drop the subscript t and measure all the firm-level independent variables at time t – 1. We specify our model as follows:

$$(1)\ \Delta\text{Mktshare}_{fc} = \beta_{0c} + \beta_{1c}\text{TI}_{fc} + \beta_{2c}\text{DP}_{fc} + \beta_{3c}\text{TB}_{fc} + \beta_{4c}\text{DB}_{fc} + \beta_{5\text{–}7c}(\text{Control variables})_{fc} + r_{fc},$$

$$(2)\ \beta_{0c} = \gamma_{00} + \gamma_{01}\text{UA}_c + \gamma_{02}\text{IND}_c + \gamma_{03}\text{INDUL}_c + u_{0c},$$

$$(3)\ \beta_{1c} = \gamma_{10} + \gamma_{11}\text{UA}_c + \gamma_{12}\text{IND}_c + \gamma_{13}\text{INDUL}_c,$$

$$(4)\ \beta_{2c} = \gamma_{20} + \gamma_{21}\text{UA}_c + \gamma_{22}\text{IND}_c + \gamma_{23}\text{INDUL}_c,$$

$$(5)\ \beta_{3c} = \gamma_{30} + \gamma_{31}\text{UA}_c + \gamma_{32}\text{IND}_c + \gamma_{33}\text{INDUL}_c,$$

$$(6)\ \beta_{4c} = \gamma_{40} + \gamma_{41}\text{UA}_c + \gamma_{42}\text{IND}_c + \gamma_{43}\text{INDUL}_c, \text{ and}$$

$$(7)\ \beta_{5\text{–}7c} = \gamma_{5\text{–}7,0},$$

where the indexes f and c refer to firm and country, respectively; $\upsilon_{0c} \sim N(0, \tau_{00})$ and $r_{fc} \sim N(0, \sigma^2)$; τ_{00} defines the variance in market share between countries; and σ^2 defines the variance in market share across firms within countries. We also include dummy variables for year (which was not significant).

Empirical Results

We report the correlations and descriptive statistics in Table 2. In this section, we present the estimates of our models (Table 3). We test for possible multicollinearity problems. Variance inflation factors are well below 10, and the condition number is below the critical value of 30 (Belsley 1991), indicating that multicollinearity is not a serious problem. To facilitate the interpretation of the results, we mean-center the firm-level variables around their country mean and center the country-level variables at the grand mean.

Null Model

In Model 1, we estimate the mean of change in market share as the sum of a fixed part, which contains the grand mean γ_{00}, and a random part, which contains two random effects at the firm and country levels.

$$\Delta\text{Market share}_{fc} = \gamma_{00} + \upsilon_{0j} + r_{fc}.$$

Model 1 suggests that countries differ in their average change in market share ($\tau_{00} = 4.39$, $p < .05$) and that there is variation among firms within countries ($\sigma^2 = 21.31$, $p < .001$). The proportion of the total variance that occurs across countries is 17% (calculated as $\tau_{00} / \tau_{00} + \sigma^2$).

Conditional Models

We include predictors in a stepwise fashion, introducing firm-level and then country-level effects. In Model 2, we find that introducing a technological innovation ($\gamma_{10} = 1.43$, $p < .001$), introducing a design innovation ($\gamma_{20} = 3.07$, $p < .001$), having broad technological product portfolio breadth ($\gamma_{30} = 3.88$, $p < .05$), and having broad design product portfolio breadth ($\gamma_{40} = 3.16$, $p < .05$) increase market share. Next, we add country-level effects (Model 3). Uncertainty avoidance ($\gamma_{01} = –.04$, $p > .05$), individualism ($\gamma_{02} = –.06$, $p > .05$), and indulgence ($\gamma_{03} = .004$, $p > .05$) do not have significant direct effects on changes in market share.

National Culture and Innovation Type. We report the moderating effects of our cultural variable block by block to reduce spurious effects. To show the robustness of our results, we also report the full model (Model 4). The results remain invariant.

Model 4a reports the moderating effects of uncertainty avoidance. H_{1a} states that as uncertainty avoidance

Table 2. Correlations

	M	SD	1	2	3	4	5	6	7
1. Market share	7.78	9.98	1						
2. Design innovation	.17	.41	.20**	1					
3. Design breadth	.40	.24	.15**	.13**	1				
4. Technological innovation	.35	.68	.17**	.22**	.12**	1			
5. Technological breadth	.49	.21	.18**	.08*	.30**	.13**	1		
6. Uncertainty avoidance	62.40	23.58	–.11**	–.001	–.007	–.03	.003	1	
7. Individualism	72.89	11.32	.001	.001	–.008	.002	–.01	–.53**	1
8. Indulgence	55.35	16.83	.13**	.002	.02	.02	.01	–.76**	.40**

*Significant at the 5% level.
**Significant at the 1% level.

increases, the positive relationship between technological innovation introductions and changes in market share is weakened. We found a negative interaction effect between uncertainty avoidance and technological innovation introductions (γ_{11} = –.08, p < .001), in support of H_{1a}. We estimate regression slope coefficients at high (i.e., two standard deviations above) and low (i.e., two standard deviations below) levels of uncertainty avoidance. At low levels of uncertainty avoidance, the effect of technological innovation on changes in market share is positive (b = 5.34, p < .01); at high levels of technological innovation, the effect is negative (b = –3.12, p < .05). Figure 1, Panel A, displays this interaction effect.

H_{1b} states that as uncertainty avoidance increases, the positive relationship between design innovation introductions and changes in market share is strengthened. We found no support for H_{1b} (γ_{21} = .03, p > .05).

We report the moderating effects of individualism in Model 4b. H_{2a} states that as individualism increases, the positive relationship between technological innovation introductions and changes in market share is strengthened. We found a nonsignificant interaction effect with technological innovation (γ_{12} = .07, p > .05). Therefore, H_{2a} receives no support. H_{2b} states that as individualism increases, the positive relationship between technological innovation introductions and changes in market share is strengthened. In support of H_{2b}, we found a positive interaction effect with design innovation (γ_{22} = .12, p < .05). The effect of design innovation on changes in market share is not significant at low levels of individualism (b = .12, p > .05) but is significant at high levels (b = 4.98, p < .01). Figure 2, Panel A, displays this interaction effect.

We report the moderating effects of indulgence in Model 4c. H_{3a} states that as indulgence increases, the positive relationship between technological innovation introductions and changes in market share is weakened. In support of H_{3a}, we found a negative interaction effect (γ_{13} = –.05, p < .001). The effect of technological innovation on changes in market share is positive at both low levels (b = 6.55, p < .01) and high levels (b = 2.59, p < .01) of indulgence. Figure 1, Panel B, illustrates this interaction effect.

H_{3b} states that as indulgence increases, the positive relationship between design innovation introductions and changes in market share is strengthened. We found a positive interaction effect (γ_{23} = .19, p < .001), in support of H_{3b}. The effect of design innovation on changes in market share is negative at low levels of indulgence (b = –5.53, p < .01) but is positive at high levels (b = 9.47, p < .01). Figure 2, Panel B, illustrates this interaction effect.

National Culture and Product Portfolio Breadth Strategies. H_{4a} states that as uncertainty avoidance increases, the positive relationship between technological product portfolio breadth and changes in market share is strengthened. As Model 4a reports, we found a nonsignificant interaction effect (γ_{31} = –.11, p > .05); thus, H_{4a} receives no support. H_{4b} states that as uncertainty

Table 3. Hierarchical Linear Modeling Results

	Model 1: Null Model	Model 2: Firm-Level Effects	Model 3: Country-Level Effects	Model 4a: Interaction with Uncertainty Avoidance	Model 4b: Interaction with Individualism	Model 4c: Interaction with Indulgence	Model 4: Cross-Level Interaction Effects
Fixed Effects							
Intercept	5.39 (1.73)***	7.71 (1.49)***	14.92 (14.01)	7.76 (1.44)**	8.19 (8.55)	5.83 (4.18)	7.53 (1.27)***
Technological innovation		1.43 (.47)**	1.42 (.46)**	1.10 (.46)*	1.35 (.45)**	4.22 (1.25)***	6.53 (1.34)***
Design innovation		3.07 (.80)***	3.09 (.80)***	2.93 (.78)***	2.71 (.78)***	2.29 (.78)**	1.68 (.76)*
Technological breadth		3.88 (1.67)*	3.88 (1.50)*	3.05 (1.65)	4.03 (1.64)*	8.53 (3.75)**	10.96 (4.32)*
Design breadth		3.16 (1.51)*	3.15 (1.51)*	3.58 (1.48)*	2.50 (1.47)	–1.27 (2.70)	.26 (2.66)
Technological reputation		.22 (.26)	.23 (.26)	.24 (.26)	.28 (.25)	.23 (.26)	.22 (.24)
Design reputation		.60 (.34)	.59 (.34)	.63 (.34)*	.42 (.33)	.66 (.33)*	.56 (.32)
Assets		.01 (.00)	.01 (.00)	.01 (.00)	.02 (.01)	.01 (.00)	.01 (.00)
Size		.10 (.10)	.10 (.10)	.08 (.10)	.08 (.10)	.08 (.10)	.08 (.09)
Uncertainty avoidance (UA)			–.04 (.08)	–.04 (.05)			–.04 (.07)
Individualism (IND)			–.06 (.13)		–.005 (.11)		–.03 (.12)
Indulgence (INDULG)			.004 (.11)			.03 (.07)	–.003 (.10)
UA × technological innovation				–.08 (.02)***			–.09 (.02)***
UA × design innovation				.003 (.01)			.04 (.01)*
UA × technological breadth				–.01 (.06)			–.003 (.08)
UA × design breadth				–.14 (.05)**			–.10 (.05)
IND × technological innovation					.07 (.04)		.05 (.04)
IND × design innovation					.12 (.06)*		.14 (.07)*
IND × technological breadth					.34 (.12)**		.39 (.14)**
IND × design breadth					.22 (.08)**		.18 (.09)*
INDULG × technological innovation						–.05 (.02)*	–.10 (.02)**
INDULG × design innovation						.19 (.04)***	.18 (.05)**
INDULG × technological breadth						–.11 (.06)	–.16 (.07)*
INDULG × design breadth						.11 (.04)*	.07 (.04)
Random Effects							
Countries (τ_{oo})	4.39 (1.6)*	3.28 (.92)*	3.27 (.91)*	3.14 (.88)*	3.26 (.91)*	3.04 (.86)*	2.98 (.84)*
Residual (σ_2)	21.31 (6.32)***	8.41 (.23)***	8.40 (.23)***	8.19 (.23)***	8.14 (.23)***	8.14 (.23)***	7.70 (.22)***

*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the .1% level.
Notes: Standard errors are in parentheses.

Figure 1. The Interaction Effect Between Cultural Variables and Technological Innovation

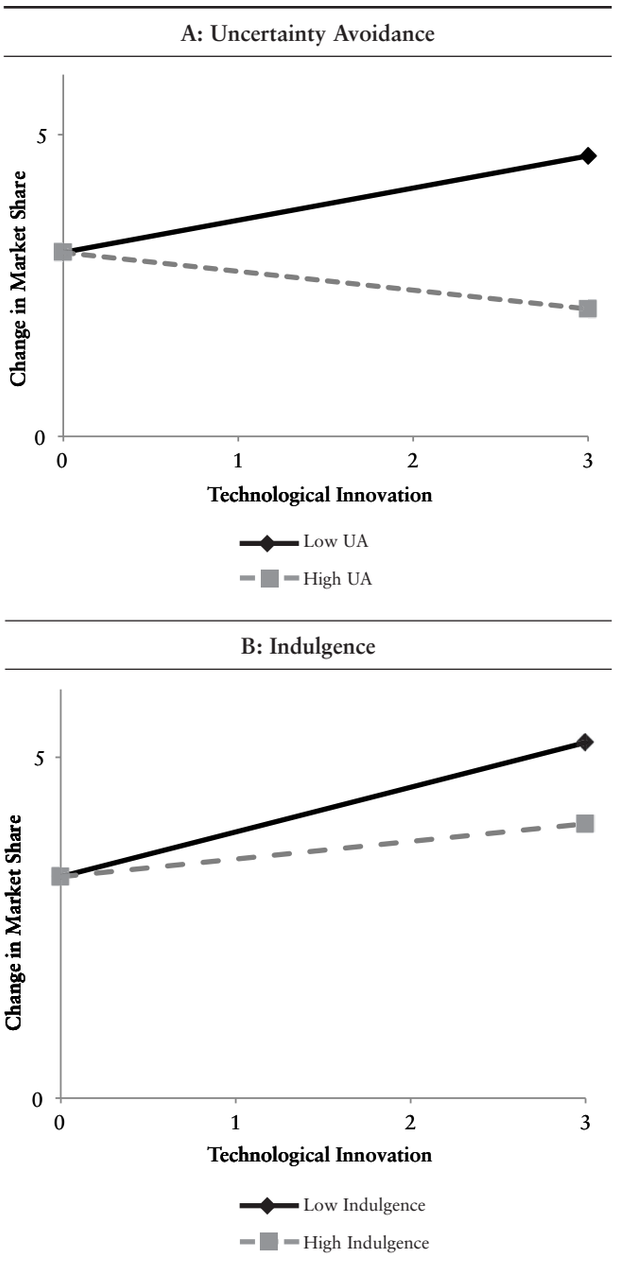
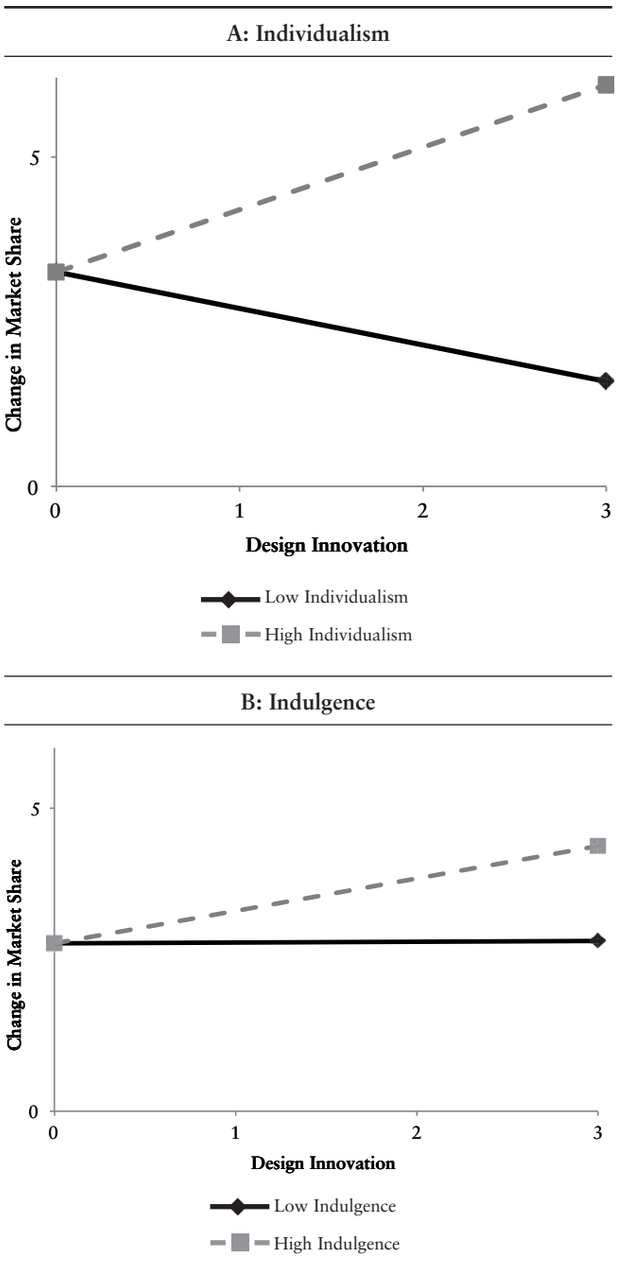


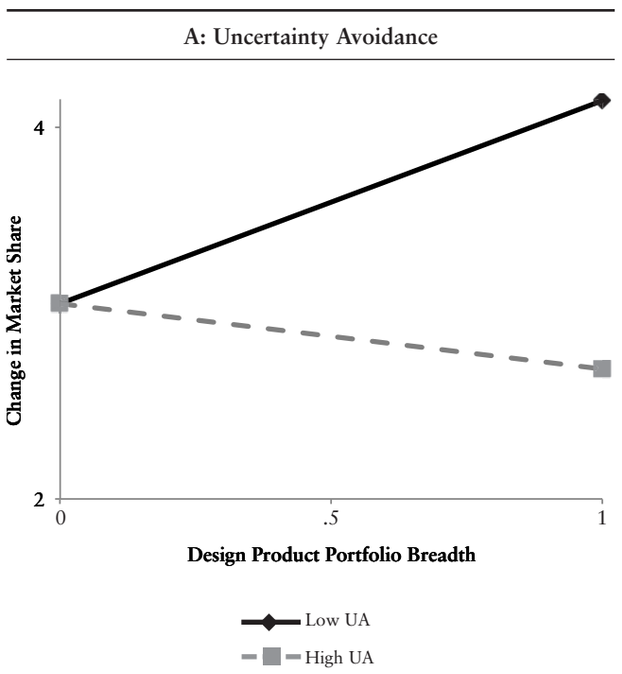
Figure 2. The Interaction Effect Between Cultural Variables and Design Innovation



avoidance increases, the positive relationship between design product portfolio breadth and market share is weakened. We found a significant interaction effect ($\gamma_{41} = -.14$, $p < .10$), in support of H_{4b}. The effect of product portfolio breadth on changes in market share is positive at low levels of uncertainty avoidance (b = 10.94, $p < .01$) but is not significant at high levels (b = –3.50, $p > .05$). Figure 3, Panel A, displays this interaction effect.

H_{5a} states that as individualism increases, the positive relationship between technological product portfolio breadth and changes in market share is strengthened. As

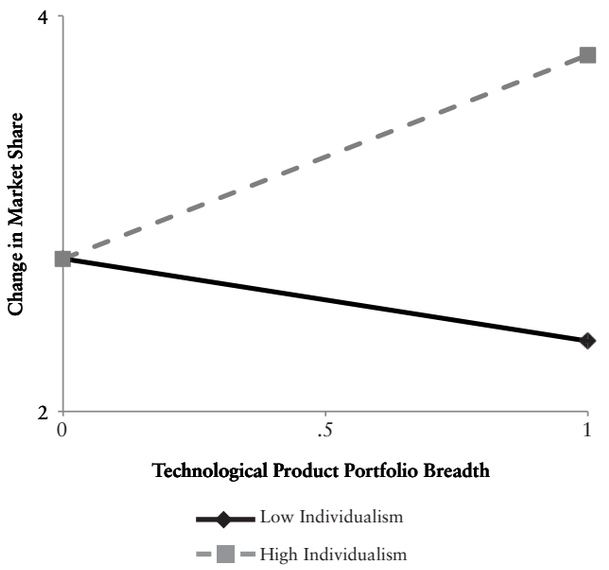
Figure 3. The Interaction Effect Between Cultural Variables and Design Product Portfolio Breadth



Model 4b reports, we found a positive interaction effect (γ_{32} = .34, p < .01), in support of H_{5a}. The effect of technological product portfolio breadth on changes in market share is not significant at low levels of individualism (b = –4.16, p > .05) but is positive at high levels of individualism (b = 10.31, p < .01). Figure 4 illustrates this interaction effect. H_{5b} states that as individualism increases, the positive relationship between design product portfolio breadth and changes in market share is strengthened. In support of H_{5b}, we found a positive interaction effect (γ_{42} = .22, p < .01). The effect of design product portfolio breadth on changes in market share is negative at low levels of individualism (b = –6.89, p < .05) but is positive at high levels (b = 12.08, p < .01). Figure 3, Panel B, illustrates this interaction effect.

H_{6a} states that as indulgence increases, the positive relationship between technological product portfolio breadth and changes in market share is weakened. We found no interaction effect (γ_{33} = –.11, p > .05); thus, H_{6a} receives no support (see Model 4c). H_{6b} states that as indulgence increases, the positive relationship between design product portfolio breadth and changes in market share is strengthened. The results provide support for H_{6b} (γ_{43} = .11, p < .05). However, the effect of

Figure 4. The Interaction Effect Between Individualism and Technological Product Portfolio Breadth



design product portfolio breadth on changes in market share is not significant at either lower levels (b = –6.54, $p > .05$) or high levels (b = –1.96, $p > .05$) of indulgence.

DISCUSSION

Theoretical Implications

This study contributes to the literature by demonstrating the market share effects of technological and design innovation strategies across national cultures, thus extending the emerging literature on design and technological innovations (e.g., Chitturi, Raghunathan, and Mahajan 2007; Rubera and Droge 2013; Rubera, Griffith, and Yalcinkaya 2012). Specifically, the results indicate that the positive effect of design innovation on changes in market share strengthens as individualism and indulgence increase; in contrast, the positive relationship between technological innovations and market share weakens as uncertainty avoidance and indulgence increase. These findings build on recent calls for cross-cultural work in innovation and demonstrate the importance of examining the type of innovation across strategies and cultures for effective operation in the global marketplace. For example, the findings lend support to the argument that design innovations do not increase performance risk but enhance social status, thereby attenuating the direct positive effect of design innovation on market share.

Although the findings provide broad support for our theoretical arguments of observability, risks, and need satisfaction differences between technological and design innovations and the role of national culture, not all our hypotheses received support. For example, the results pertaining to the moderating role of individualism provide no support for the theorized relationship between technological innovation and market share. We theorized that consumers in more individualist cultures would be more receptive to both technological and design innovations because these innovations allow them to separate from others, thus strengthening the positive effect. Contrary to our theorization, the results suggest that technological innovations, due to their lower visibility in use, are not effective in establishing social differentiation. This finding also implies that consumers may opt for design innovations, rather than technological innovations, to satisfy this need.

This research also extends the literature on the design and technological product portfolio breadth strategies under various national cultural contexts. Previous research on product portfolio breadth strategies has demonstrated that the breadth of product portfolios significantly influences firm performance (Caves and Ghemawat 1992; Fernhaber and Patel 2012; Galbraith and Schendel 1983; Girotra, Terwiesch, and Ulrich 2007). Extending this stream of research, we provide evidence that national culture significantly influences the effectiveness of design and technological innovation product portfolio breadth as a means of increasing market share. Specifically, we found that the positive relationship between design product portfolio breadth strategies and changes in market share is strengthened as individualism and indulgence increase but is weakened as uncertainty avoidance increases; in contrast, the positive relationship between technological product portfolio breadth and changes in market share is strengthened as individualism increases. These findings lend support to our theoretical argument that design product portfolio breadth increases social risk, thus lowering market share gains.

Surprisingly, we find no support for several relationships—for example, the moderating effects of uncertainty avoidance on the relationship between technological product breadth and marketing share or the moderating effect of uncertainty avoidance on the relationship between design innovation and market share. In the first case, we theorized that broad technological portfolio breadth would reduce performance risk because it allows consumers to choose from both newer and older technologies. In this way, we argued that the firm can capture multiple consumer segments (both risk takers and risk avoiders). Our findings imply that consumers in cultures with high uncertainty avoidance may not perceive the firm's breadth of products as a risk-avoiding strategy (e.g., it might instead be a function of offerings in the marketplace). Similarly, we argued that as uncertainty avoidance increased, the positive effect of design innovation on market share would be strengthened. The lack of a moderation effect suggests that uncertainty avoidance is not related to emotions, thus failing to enhance the social benefit of design.

Taken together, the findings extend the international marketing literature on innovations (e.g., Chandrasekaran and Tellis 2008; Filipescu et al. 2013; Rubera, Griffith, and Yalcinkaya 2012). Specifically, they fill the gap in the literature on technological and design innovations and provide unique, theoretical insights into how national culture influences the effectiveness of differing types of innovations as well as overall product portfolio breadth.

Managerial Implications

From a managerial standpoint, this research identifies the unique effects global marketing managers may experience when engaging in new product innovation and product portfolio breadth strategies. First, the findings indicate the complexity international marketing managers face when engaging in technological and design innovations and product portfolio breadth strategies. Culture comprises multiple dimensions. Often, managers search for cases in which culture-free associations exist, to engage in strategic standardization. Our findings demonstrate that while instances in which a single cultural dimension is influential may exist, they may not influence all relationships. Thus, managers need to carefully identify which cultural dimensions they are operating within and how these cultural dimensions may influence the effectiveness of their strategies. For example, our findings indicate that when firms operate in cultures of greater indulgence (e.g., Venezuela, Argentina, the United Kingdom), the positive effect of a design innovation on market share is strengthened, whereas the positive effect of a technological innovation introduction on market share is weakened.

Second, though not hypothesized, we found that while both design and technological innovations positively increase a firm's market share, design innovations have a larger positive influence. This is important because it suggests the type of innovations a global marketing manager should emphasize when determining marketing investments in new product types. However, we caution managers not to overreact to this finding because it may be due to the type of innovations examined. Specifically, the technological and design innovations examined are substantively different. That is, the technological innovations tended to be more incremental (e.g., increases in battery life or talk time), whereas the design innovations tended to be more substantive (e.g., dual slider or flip phone). As such, we suggest that international marketing managers should carefully account for the nature of the innovation (from radical to incremental) when considering investments in design and technological innovations.

LIMITATIONS AND FURTHER RESEARCH

Although this study provides new and important insights into the effects of technological and design innovation strategies across national cultures, it is not without limitations. First, we analyzed only eight countries in Europe. However, the sampled countries are diverse in national culture, thus providing a relatively strong test of the hypotheses. Nonetheless, a larger number of countries could provide a more expansive perspective of the phenomenon under study. Furthermore, it would be useful to examine the model in other, non-European markets.

Second, we examined products that are primarily product design and technological innovations. Although the cell phone industry provides a good examination of unique innovation types (with the potential exception of Bluetooth), there are instances in which a product is not primarily a technological or design innovation but rather is more equally balanced. As such, further research could examine the intricacies of firm strategies and consumer response when both innovation types are introduced.

Third, although the cell phone industry provides many advantages (e.g., it is characterized by many design and technological innovations, is relatively young, has global players, has an oligopolistic market), examining different product categories would increase the generalizability of this work. For example, it could be argued that consumers value design and technology differently across product categories (and across national cultures), and therefore, the effectiveness of pioneer and product portfolio breadth strategies could differ depending on product category. Furthermore, addressing product-specific effects, such as regulations and launch strategies, could provide a more robust model. Thus, extending this work into other product categories and deepening the concepts covered could provide greater insights into whether the results are generalizable.

Fourth, although our measure of national culture is consistent with extant literature (e.g., Chandrasekaran and Tellis 2008; Engelen and Brettel 2011; Lee, Trimi, and Kim 2013; Tellis, Stremersch, and Yin 2003), measurement of culture at the individual level could provide new insights. Specifically, although researchers have argued that countries can serve as surrogates for national culture, within each country, variation along each cultural dimension exists among consumers. As such, new managerial insights into the intricacies of consumer response to design and technological innovations as a market segmentation approach might be gained by examining culture at the individual level. Building a cross-national and cross-cultural model, such as that by Agarwal, Malhotra, and Bolton (2010), could also provide new insights.

Fifth, although changes in market share present a prism through which to view firm performance, other meas-

ures, such as profitability and sales revenue, are also salient to international marketing managers. As such, research exploring technological and design strategies could include a broader range of performance metrics to provide a more comprehensive picture of the effects of pioneer and product portfolio breadth strategies. For example, building on Filipescu et al.'s (2013) work, which unpacks the causality between technological product innovations and exports, researchers could work to uncover the diversity of relationships between the type of innovation and product portfolio breadth strategies in exporting.

In conclusion, the results of this study provide clear and convincing evidence of the unique effects of technological and design innovations and the effectiveness of these strategies in a variety of national cultural contexts. As such, this study can serve as a foundation for both scholars interested in the strategic implication differences of design and technological innovations and marketing managers charged with strategic innovation decisions in a global context.

NOTES

1. Data availability is limited to 1999–2007 because of a change in the data collected and reported by Alatest.

REFERENCES

Agarwal, James, Naresh K. Malhotra, and Ruth N. Bolton (2010), "A Cross-National and Cross-Cultural Approach to Global Market Segmentation: An Application Using Consumers' Perceived Service Quality," *Journal of International Marketing*, 18 (3), 18–40.

Bass, Frank M. (1969), "A New Product Growth Model for Consumer Durables," *Management Science*, 15 (5), 215–27.

Belsley, David A. (1991), *Conditioning Diagnostics: Collinearity and Weak Data in Regression*. New York: John Wiley & Sons.

Berger, Jonah A. and Chip Heath (2007), "Where Consumers Diverge from Others: Identity Signaling and Product Domains," *Journal of Consumer Research*, 34 (August), 121–34.

Bordley, Robert (2003), "Determining the Appropriate Depth and Breadth of a Firm's Product Portfolio," *Journal of Marketing Research*, 40 (February), 39–53.

Bryk, Anthony S. and Stephen W. Raudenbush (1992), *Hierarchical Linear Models: Applications and Data Analysis Methods*. Newbury Park, CA: Sage Publications.

Caves, Richard E. and Pankaj Ghemawat (1992), "Identifying Mobility Barriers," *Strategic Management Journal*, 13 (1), 1–12.

Chandrasekaran, Deepa and Gerard J. Tellis (2008), "Global Takeoff of New Products: Culture, Wealth, or Vanishing Differences?" *Marketing Science*, 27 (5), 844–60.

Chitturi, Ravindra, Rahagopal Raghunathan, and Vijay Mahajan (2007), "Form Versus Function: How the Intensities of Specific Emotions Evoked in Functional Versus Hedonic Trade-Offs Mediate Product Preferences," *Journal of Marketing Research*, 44 (November), 702–714.

Creusen, Mariëlle E.H. (2011), "Research Opportunities Related to Consumer Response to Product Design," *Journal of Product Innovation Management*, 28 (3), 405–408.

Djelic, Marie-Laure and Antti Ainamo (2005), "The Telecom Industry as Cultural Industry? The Transposition of Fashion Logics into the Field of Mobile Telephony," in *Transformation in Cultural Industries*, C. Jones and P.H. Thornton, eds. Amsterdam: Elsevier, 45–80.

Dwyer, Sean, Hani Mesak, and Maxwell Hsu (2005), "An Exploratory Examination of the Influence of National Culture on Cross-National Product Diffusion," *Journal of International Marketing*, 13 (2), 1–27.

Eisenman, Micki (2009), "Aesthetic Innovation: Changing Institutional Logics in Standardized High-Technology Industries," Technology, Innovation and Institutions Working Paper Series, [available at http://www.business.ualberta.ca/Centres/TCC/~/media/business/Centres/TCC/Documents/WorkingPapers/TII17Eisenman.ashx].

Engelen, Andrea and Malte Brettel (2011), "A Cross-Cultural Perspective of Marketing Departments' Influence Tactics," *Journal of International Marketing*, 19 (2), 73–94.

Fernhaber, Stephanie A. and Pankaj C. Patel (2012), "How Do Young Firms Manage Product Portfolio Complexity? The Role of Absorptive Capacity and Ambidexterity," *Strategic Management Journal*, 33 (13), 1516–39.

Filipescu, Diana A., Shameen Prashantham, Alex Rialp, and Josep Rialp (2013), "Technological Innovation and Exports: Unpacking Their Reciprocal Causality," *Journal of International Marketing*, 21 (1), 23–38.

Galbraith, Craig and Dan Schendel (1983), "An Empirical Analysis of Strategy Types," *Strategic Management Journal*, 4 (2), 153–73.

Gatignon, Hubert and Thomas S. Robertson (1985), "A Propositional Inventory for New Diffusion Research," *Journal Consumer Research*, 11 (4) 849–67.

Girotra, Karan, Christian Terwiesch, and Karl T. Ulrich (2007), "Valuing R&D Projects in a Portfolio: Evidence from the Pharmaceutical Industry," *Management Science*, 53 (9) 1452–66.

Govindarajan, Vijay and Chris Trimble (2012), *Reverse Innovation: Create Far from Home, Win Everywhere*. Boston: Harvard Business Review Press.

Hoegg, JoAndrea and Joseph W. Alba (2011), "Seeing Is Believing (Too Much): The Influence of Product Form on Perceptions of Functional Performance," *Journal of Product Innovation Management*, 28 (3), 346–59.

Hofstede, Geert (1983), "The Cultural Relativity of Organizational Practices and Theories," *Journal of International Business Studies*, 14 (2), 75–90.

——— (2001), *Culture's Consequences*, 2d ed. Beverly Hills, CA: Sage Publications.

———, Geert J. Hofstede, and Michael Minkov (2010), *Cultures and Organizations: Software of the Mind*. New York: McGraw-Hill.

Inkeles, Alex and Daniel J. Levinson (1969), "National Character: The Study of Modal Personality and Sociocultural Systems," in *The Handbook of Social Psychology*, Vol. 4, G. Lindzey and E. Aronson, eds. Cambridge, MA: Addison-Wesley.

International Telecommunication Union (2013), "ICT Facts and Figures," (accessed May 9, 2013), [available at http://www.itu.int/ITU-D/ict/statistics/].

Lee, Ruby P. and Kevin Zheng Zhou (2012), "Is Product Imitation Good for Firm Performance? An Examination of Product Imitation Types and Contingency Factors," *Journal of International Marketing*, 20 (3), 1–16.

Lee, Sang-gun, Silvana Trimi, and Changsoo Kim (2013), "The Impact of Cultural Differences on Technology Adoption," *Journal of World Business*, 48 (1), 20–29.

Mick, David G. and Susan Fournier (1998), "Paradoxes of Technology: Consumer Cognizance, Emotions, and Coping Strategies," *Journal of Consumer Research*, 25 (2), 123–43.

Midgley, David F. (1983), "Patterns of Interpersonal Information Seeking for the Purchase of a Symbolic Product," *Journal of Marketing Research*, 20 (February), 74–83.

Molden, Daniel C., Angela Y. Lee, and E. Tory Higgins (2008), "Motivations for Promotion and Prevention," in *Handbook of Motivation Science*, J. Shah and W. Gardner, eds. New York: Guilford Press, 169–87.

Newman, Jared (2013), "Design Innovation: The PC's Secret Weapon in the War for Relevance," *PCWorld*, (April 26), [available at http://www.pcworld.com/article/2036410/design-innovation-the-pcs-secret-weapon-in-the-war-for-relevance.html].

Rindova, Violina and Antoaneta P. Petkova (2007), "When Is a New Thing a Good Thing? Technological Change, Product Form Design, and Perceptions of Value for Product Innovations," *Organization Science*, 18 (2), 217–32.

Rubera, Gaia and Cornelia Droge (2013), "Technology Versus Design Innovation's Effects on Sales and Tobin's Q: The Moderating Role of Branding Strategy," *Journal of Product Innovation Management*, 30 (3), 448–64.

———, David A. Griffith, and Goksel Yalcinkaya (2012), "Technological and Design Innovation Effects in Regional New Product Rollouts: A European Illustration," *Journal of Product Innovation Management*, 29 (6), 1047–1060.

——— and Ahmet H. Kirca (2012), "Firm Innovativeness and Its Performance Outcomes: A Meta-Analytic Review and Theoretical Integration," *Journal of Marketing*, 76 (May), 130–47.

Steenkamp, Jan-Benedict E.M., Frenkel ter Hofstede, and Michel Wedel (1999), "A Cross-National Investigation into the Individual and National Cultural Antecedents of Consumer Innovativeness," *Journal of Marketing*, 63(April) 55–69.

Sun, Sunny Li and Ruby P. Lee (2013), "Enhancing Innovation Through International Joint Venture Portfolios: From the Emerging Firm Perspective," *Journal of International Marketing*, 21 (3), 1–21.

Talke, Katrin, Sören Salomo, Jaap E. Wieringa, and Antje Lutz (2009), "What About Design Newness? Investigating the Relevance of a Neglected Dimension of Product Innovativeness," *Journal of Product Innovation Management*, 26 (6), 601–615.

Tellis, Gerard J., Stefan Stremersch, and Eden Yin (2003), "The International Takeoff of New Products: The Role of Economics, Culture, and Country Innovativeness," *Marketing Science*, 22 (2), 188–208.

Van den Bulte, Christophe and Stefan Stremersch (2004), "Social Contagion and Income Heterogeneity in New Product Diffusion: A Meta-Analytic Test," *Marketing Science*, 23 (4) 530–44.