Deconstructing Innovation: An Exploratory Study of the US Furniture Industry

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Abstract

The Merriam-Webster's dictionary defines innovation as (1) the introduction of something new or (2) a new idea, method, or device. Many empirical studies suggest that innovation is an important driver for developing or maintaining firm competitiveness. Innovation has been linked to improving products, production processes, supply chain efficiencies, market research, customer retention, business systems, relationships with exchange partners, profitability, and competitiveness. But how does it work? How can innovation be measured? In this study, we examined innovation in the US furniture industry. First, we deconstructed innovation into three broad categories: product, production processes, and company culture. Second, we examined relationships between the innovation subcomponents and the internal/external demographic characteristics of company size, company location population, age of employees, and education level of employees. Results show that although we were able to develop the three innovation constructs, only 25 percent of their hypothesized relationships to demographic factors followed hypothesized patterns of significance or directionality.

Over the past decade, the US furniture industry has faced a steep decline in shipments and share of domestic consumption. According to Cochran (2008) as cited in Luppold and Bumgardner (2009), the main reason for this is the 71 percent increase in furniture imports over this period. In aggregate, total US furniture imports grew dramatically from $1,115.3 million in 1997 to $5,075.4 million in 2007 with China leading this import growth (US International Trade Commission 2009). The United States is the largest furniture importer in the world (Carroll 2005, cited by Cao and Hansen 2005) and accounts for about one-quarter of total world furniture consumption (Tracogna and di Belgiojoso 2008). What remains of the US furniture and related manufacturing sector is concentrated in three geographic locations: the Midwest, the South, and Southwest (Schuler and Lawser 2007).

Why has the US furniture sector declined so rapidly? What factors might lead to regaining competitiveness? Bullard (2002) observed that the most important source of change in the furniture industry, and in many other industries, is the ability for suppliers, producers, distributors, and consumers to send and receive ''rich'' information, which includes implementing new information and communication technologies. However, technology, whether it is in the realm of information, communication, or production, is but one contributing factor for increasing competitiveness. Susnjara (2002) suggests a new furniture industry paradigm involves new relationships between furniture manufacturers, material and technology suppliers, and customers to make supply chains stronger and more competitive in the new world economy. Another contributing factor to competitiveness is innovation.

Innovation

The terms innovative and innovation are used to describe the flexibility of firms in meeting changes in the business environment (Tyson 1997). Innovation has a broad array of definitions (Cao and Hansen 2006) going back to Schumpeter (1934, cited by Cao and Hansen 2006), who defined innovation as the motor of economic development. According to Dewar and Dutton (1986), innovation is a tangible

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new idea, practice, or object relative to its precursor. Change can be made in manufacturing technology, production processes, labor, capital, infrastructure, and overall market knowledge. To be successful, the paramount task of a firm is to determine the perceptions, needs, and wants of the market in order to create products or services with superior value (Lievens and Moenaert 2000). Firms should constantly scan the business landscape to identify new opportunities to satisfy their customers and provide solutions to changing market needs (Weerawardena 2003).

Schumpeter (1934) first conceptualized modern innovation theory when he defined innovation broadly as a discontinuously occurring implementation of new combinations of means of production (Kubeczko and Rametsteiner 2002). In its various forms and iterations, innovation has long been recognized as being a positive influence on a firm's competitive advantage (Brown and Eisenhardt 1995, Cooper 1996, Stock et al. 1996, Motwani et al. 1999, Damanpour and Gopalakrishnan 2001, Scarborough and Zimmerer 2002).

Many activities can constitute innovation, such as new product development, product line improvements and extensions, improvements in production processes, and innovative marketing and management practices (Wagner and Hansen 2005). Although the most familiar forms of innovation are new or improved products or manufacturing systems, innovation can also take place in business management processes (Nybakk et al. 2009). Morris (2006) suggests that innovation can be classified into four categories: incremental innovations, product and technology breakthroughs, business model innovations, and new ventures. According to Nybakk et al. (2009), truly new innovations are often referred to as ''new-to-the-world innovations'' or ''radical innovations,'' while improvements in existing products, services, or management practices are referred as incremental innovations.

Why is innovation important?

Competitive position is often predicated on proprietary products and/or market knowledge, which can be translated into market power (Hirsch and Bijaoui 1985). External forces such as the power of customers and the intensity of rivalry among existing competitors also have significant impacts on firm performance and its competitiveness (Wan and Bullard 2009). Linkages and interrelationships between firm innovation, performance, and the often hidden precursors to innovation are complex. For example, the intensity of innovation performance strongly depends on exporting activity, management training and skills, supply chain networks, research and development expenditures, etc. (Dobrinsky 2008). Management of these interrelationships is compounded by the need for firms to develop and launch new or improved products and services (Drew 1997).

Crespell et al. (2006) noted that innovation is important for developing or maintaining firm competitiveness and for positively influencing firm growth. They go on to suggest that being innovative in developing new or improved products, processes, or business systems can help better satisfy customer needs, stay ahead of the competition, and explore new markets. According to Neira et al. (2009), innovation performance is related to planning for the future, exploring potential markets, investing in new products, and improving internal operations and capacities. They suggest that the customer-centric marketing concept that defines distinct organizational structures and articulates a fundamental set of shared beliefs is the foundation of innovation.

Porter (1998, cited by Cao and Hansen 2006) noted that innovation is an important source of competitiveness, by which companies gain advantages through organizing and conducting value-adding activities in a new way. Innovation is posited to directly and positively correlate to firm competitiveness (Crespell et al. 2006) and to be a driver of firm growth (Narver and Slater 1990). Bullard and West (2002) suggest that adapting to changes in competitive markets through innovation is necessary for firms to survive. According to Freeman and Soete (1997, cited by Ong et al. 2003) technological innovation in manufacturing companies is one of the main engines for competitiveness. For many companies, innovation has become embedded in corporate culture and is an important weapon to promulgate competitiveness and long-term firm success.

Sources of innovation

There are many potential sources of innovation from within and outside a company. Within a company, an organizational culture that promotes innovation is characterized by high levels of supervisor encouragement, team cohesion, and employee autonomy (Crespell et al. 2006). Innovation is also linked to the level of employee training and employee skill sets. According to Verworn and Hipp (2009), highly skilled employees had a positive effect on innovation. The teacher–student interface where knowledge is transferred in a rapidly evolving area such as innovation requires increased frequency and quality of training interactions that include hands-on experience, skill set evaluation, pertinent facts, relationship building, and developing shared values, thinking processes, and meaning (Mládková 2008).

Employees can also play an important role in a corporate structure to provide the impetus for innovation as well as influencing successful innovation implementation. Recognizing an individual's potential and developing his/her skills, combined with motivation and incentives to promote innovation, can often positively change an organization (Tan and Kaufmann 2008). Conversely, innovation is difficult to achieve in organizations that do not encourage risk taking or tolerate failure (Tan and Kaufmann 2008).

Organizational structure also plays a role in innovation. Hartman et al. (1994) indicated that there are three broad employee categories in an organization: (1) top (or strategic), (2) middle (or administrative), and (3) lower (or operational). A number of authors (Kanter 1983; Lovelace 1986; Sebora et al. 1994, cited by Ong et al. 2003) revealed that innovation decreases among employees as one moves down this hierarchy typically because it is not encouraged or rewarded. This strongly suggests that successful innovation ideation and implementation should be encouraged and rewarded for employees at all organizational levels.

Although employees in general can influence corporate innovation, top managers usually have the most responsibility for generating innovative in their organizations (Sebora et al. 1994, cited by Ong et al. 2003). Ong et al. (2003) suggest that employees in middle management are typically involved with coordinating and implementing innovative ideas originating from upper management. Operational level employees, if encouraged to do so, can also play an important role in the generation and implementation of innovation in an organization (Ong et

al. 2003). These employees are ''on the ground'' and can often identify opportunities for product and process improvement. The quality of relationships between supervisors and subordinates is also related to individual innovativeness (Scott and Bruce 1994). If employees are given autonomy and decision-making roles, they can more readily develop an innovativeness mindset leading toward contributions to the firm (Cotgrove and Box 1970, cited by Ong et al. 2003).

Externally, suppliers are an important source of innovation and improvement (Helmsing 1999). Azadegan et al. (2008) classify supplier innovation into three groups: the first group focuses on innovation in the context of manufacturer–supplier strategic alliances, the second group focuses on innovation in the context of joint manufacturer–supplier new product development, while the third group focuses on a sourcing strategy for outsourcing of innovation. Supplier innovativeness can enhance manufacturer capabilities, and supplier innovation can actually be a possible indicator of (buyer) innovation (Schiele 2006).

The demographic drivers we examined

Company size.—Company size can also influence the ability to innovate. In the field of innovation development, Schumpeter (1934) hypothesized that innovative industries are influenced by large firms, a theory that was tested with similar results by many successive researchers (see Ács and Audretsch 1987, 1990; Syrneonidis 1996; and Rogers 2004). Pavitt et al. (1987) exploring UK companies and Ács and Audretsch (1990) investigating US companies both found a positive relationship between company size and level of innovative activity in a variety of different industries. Ács and Audretsch (1987) posit that large companies will better achieve innovative advantage in industries that generate large amounts of capital goods and imperfect competition, while small companies will achieve better innovative activities in highly developed industries and in ''healthy'' competitive markets.

Further, Zemplinerova (2009) suggests that market-dominant firms tend to allocate higher budgets to research and development, which often leads to innovation. Ács and Audretsch (1987) also pointed out that large companies, by nature of their scale, are more able to devote resources to innovation. Schumpeter (1934, cited by Crespell et al. 2006) also argued that large companies often have better conditions for innovation because large companies can set aside a large part of their earned income for research and development, which is not the case in small- or medium-sized businesses (Laforet and Tann 2006). Cohen and Klepper (1996) found that company income attributed to innovation is positively correlated to company size; in addition, they found that process innovation has a stronger linkage to income generation than does product innovation. Finally, in a study of German companies, researchers found that large companies invested a higher percentage of corporate revenue in innovation (Fritsch and Meschede 2001).

However, contrary to research of previous authors, Gellman Research Associates, Inc. (1982, cited by Ettlie and Rubenstein 1987) found that small businesses were developing 2.5 times more innovations relative to large firms. This was supported by Jelacic et al. (2008), who found that small firms attach more importance to innovation and innovativeness. According to Salavou et al. (2004), small companies are more flexible and more connected to customers. In addition, Jong and Marsili (2006) came to the conclusion that those small companies that have a clearly defined development strategy are much more sensitive to market changes and are more able to anticipate new market conditions and customer needs. Madrid-Guijarro et al. (2009) believe that if the innovation in small companies is not an important component of their business strategy, they may become uncompetitive quickly after entering a new market space.

Locational influences on corporate innovation.—Locational and geospatial attributes have also been identified as key factors in influencing innovation and technological change (Audretsch and Feldman 2003). According to Audretsch and Fritsch (1999) geographic-specific factors that influence firm location are human capital, labor skills, unemployment rate, population density, manufacturing wages, and taxes. Furthermore, location decisions will take into account availability of capital, technology, and competitive production costs (Clark et al. 2000). Devereux and Griffith (1998) suggest that geographical location decisions are often made based on colocating in proximity to businesses with similar product offerings. This is consistent with the conclusion of Brülhart (1998) that companies tend to cluster in areas where competition is present. Colocation tends to facilitate knowledge transfer; ''it is easier to cross the 'hallways and streets' than 'oceans and entire continents' in order to discover new insights and knowledge'' (Glaeser et al. 1992). Feldman (1994) suggests that such proximity enhances the ability of companies to exchange ideas and provide information about new business opportunities and market changes and thus reduces uncertainty in development of innovation.

Jacobs (1969, cited by Glaeser et al. 1992) and Bairoch (1988) considered that the majority of innovations are developed in urban environments as a result of the synergistic concentration of occupations and industries. Shefer and Frenkel (1998) and Frenkel et al. (2001) found a higher degree of company innovativeness in urban areas relative to suburban and smaller urban areas, although these differences were not statistically significant. In the Norwegian manufacturing industry, Asheim and Isaksen (in press) found that in centralized (urban) areas radical innovations are more prevalent, while companies in rural and less centralized environments tend to develop innovation incrementally.

Employee age and education.—Employees are also a source of innovation. Companies that embrace individual development, combined with motivating and encouraging employees to ''think'' and not just ''do,'' will positively influence innovation. Innovation in organizational units also requires taking risks and an acceptance that failure can lead to success (Tan and Kaufmann 2008).

Mohnen and Röller (2005) noted that employee skills and knowledge significantly affect innovation. In a multinational study, they found that for many companies across different industries, shortages of highly educated and skilled labor are the most serious obstacles to the creation of innovation and development of innovative activities.

The modern view of innovation emphasizes the importance of knowledge of employees in all functions of the firm (Leiponen 2005), with highly educated employees being considered one of the main sources of ideas for new products, processes, and ways of doing business and,

subsequently, a main driver of innovation (Bozic and Radas 2005, Østergaard et al. 2008). By analyzing the structure and characteristics of employees and their influences on innovation, Verworn and Hipp (2009) noted that the company, to become and remain innovative, needs to employ creative and, above all, highly educated persons and that a high proportion of highly educated staff members has a significant positive impact on the development of innovations.

Businesses that are characterized by high levels of employee incentives for innovation by supervisors and management and a team approach focused on innovation can create a dominant position in the sector in which it operates (Crespell et al. 2006).

With regard to employee age and innovation, Verworn and Hipp (2009) did not confirm the hypothesis that firms with a higher proportion of older persons are less innovative. However, companies with a high percentage of elderly employees are less future oriented and often require additional investments in training and education. Østergaard et al. (2008) studied a sample of 1,648 Danish companies and found that the average age of employees has no significant impact on innovation development and that the dispersion in the age structure of employees had significantly negative impacts on innovation.

The Study

Objectives and methodology

The research objectives in this study were to (1) characterize the US furniture manufacturing industry; (2) delineate innovation into three areas, product, process, and company culture; and (3) test hypotheses of innovation relationships to demographic factors (company size, locational population, age of employees, and employee education level).

Hypotheses for testing

Based on the previously cited literature, we hypothesized relationships between the four respondent demographic indicators and the three subcomponents of innovation. Specifically, as also shown in Figure 1, the hypotheses tested are as follows:

H_{1a}: There is a positive relationship between company size and product innovation.

H_{1b}: There is a positive relationship between company size and production process innovation.

H_{1c}: There is a positive relationship between company size and corporate culture innovation.

H_{2a}: There is a positive relationship between locational population and product innovation.

H_{2b}: There is a positive relationship between locational population and production process innovation.

H_{2c}: There is a positive relationship between locational population and corporate culture innovation.

H_{3a}: There is a negative relationship between age of employees and product innovation.

H_{3b}: There is a negative relationship between age of employees and production process innovation.

H_{3c}: There is a negative relationship between age of employees and corporate culture innovation.

H_{4a}: There is a positive relationship between education of employees and product innovation.

H_{4b}: There is a positive relationship between education of employees and production process innovation.

H_{4c}: There is a positive relationship between education of employees and corporate culture innovation.

Research design

The sample frame was a random sample of 430 US wood-based nonupholstered furniture manufacturers, the maximum number of companies we could survey given funding constraints for the study. The mailing list was purchased from Best Mailing Lists, Inc., a national list provider. All survey recipients were identified by name and title (either owner or president). We used a mail survey approach based on procedures recommended by Dillman (2000) that allowed for data collection over a broad geographic area and for low cost for data entry (Zahs and Baker 2007).

A questionnaire was developed based on the research objectives. Foundation constructs (internal firm factors, external firm factors, and innovation) were measured with multiple-item Likert-type scales based on Churchill's (1979) suggestion that no single item is likely to provide a perfect representation of the general idea. The item scales were anchored on 1 = strongly disagree to 5 = strongly agree or 1 = very unimportant to 5 = very important. In addition, other nonconstruct questions were multichoice measures because they can often be superior to a single, straightforward question (Thorndike 1967, cited by Lewis-Beck et al. 2004). Finally, in some cases simple Yes/No binomial questions were posed.

The questionnaire was designed to solicit information on respondent companies' general profile, operations, and markets and marketing. The Organization for Economic Cooperation and Development (2005) *Oslo Manual* and Eurostat (2006) ''Community Innovation Statistics'' items were modified to fit the context of furniture manufacturing companies. A draft version of the questionnaire was pretested with 10 randomly sampled companies. Based on pretesting responses, comments, and suggestions, a final survey instrument was developed.

Following the tailored design method of Dillman (2000), prenotification postcards were sent to the 430 furniture manufacturers in the sample frame notifying them of the study and requesting their cooperation. One week later, we sent each company a questionnaire, a cover letter explaining the importance of the research study, and a self-addressed postage-paid return envelope. One week after this mailing, we sent a reminder postcard. A second mailing was sent 3 weeks later to first-mailing nonrespondents. The survey process ended in late fall 2009.

Results

Of the 430 surveys mailed, 115 surveys were undeliverable. We received 74 usable surveys resulting in an adjusted response rate of 23.5 percent [Usable Surveys/(Total Sample − Undeliverable) × 100]. Questionnaire quantitative data were coded and entered into SPSS for analysis and interpretation.

Nonresponse bias is often a common concern in survey research. Nonresponse is a problem in any survey because it raises the question of whether those who did respond are different in some important way from those who did not respond (Dillman 2000). Bias due to nonresponse can be evaluated by comparing those who responded to the initial

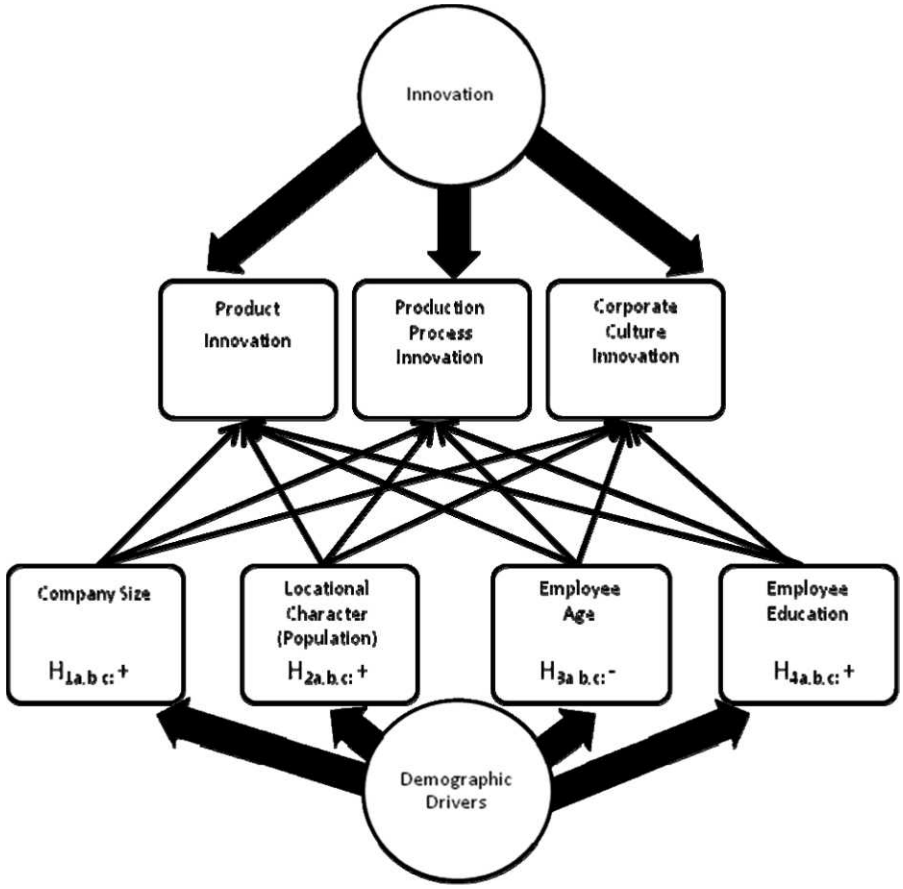

Figure 1.—Model of hypotheses tested.

mailing with those who responded because of subsequent mailings and other follow-up efforts (Armstrong and Overton 1977). Accordingly, second-mailing respondents, as a proxy for nonrespondents, were compared with first-mailing respondents for the 128 questions in the survey instrument. Two-tailed t test statistics for independent samples resulted in no differences at $\alpha = 0.05$ for any variable; accordingly nonresponse bias is not considered to be a problem. Levene's test was performed to test for equal variances between respondent groups. In the one variable where the significance value of the Levene's test was significant ($P < 0.05$), the t test assumed an unequal variance. However, significant differences were found between the 315 nonrespondents and 74 respondents with regard to the region where they are headquartered. This disparity is indicated in Figure 2. Accordingly, because nearly 50 percent of the respondents are in the North Central region, it cannot be assumed that results are representative of the United States as a whole.

Additional demographics

In order to confirm that we reached key informants, respondents were asked to indicate their position within their company. Of the 74 respondents, 60 percent were company owners and 24 percent were company presidents. The balance were company managers (7%), chief executive officers (1.5%), executive directors (1.5%), or plant managers (1%); 5 percent did not identify their position within their company. We then asked respondents to identify the type of community where their company is headquartered. One-third of the companies are located in small cities (between 10,000 and 50,000 people); 22 percent of companies are located in rural areas (fewer than 2,500 residents); 18 percent of companies are located in small cities or towns (2,500 to 9,999 residents); and 12 percent of companies are located in a very large city (1 million residents or more). Finally, 7 and 8 percent have headquarters in medium cities (50,000 to 250,000 residents) and large cities (250,000 to 999,999 residents), respectively.

Respondents were also asked to indicate the number of years they have been in business. The earliest year of establishment was 1910, while the most recent company to be established was in 2009. Overall, the mean number of the years in business was 35 years. With regard to corporate ownership, all respondent companies are US owned. In addition, only 1 percent of respondent companies are publicly traded, with the remaining 99 percent being family-owned enterprises.

As mentioned earlier, company size is often positively correlated to innovation in addition to research and development expenditures, production process improvements, and other metrics of company growth and stability. Respondents were asked to indicate corporate total gross sales in 2008. Eighty-three percent of respondents indicated that their total gross sales were $5 million or less. Of the remaining 17 percent of respondents, 10 percent indicated their 2008 total gross sales were between $6 million and $10 million, 6 percent indicated their total gross sales were

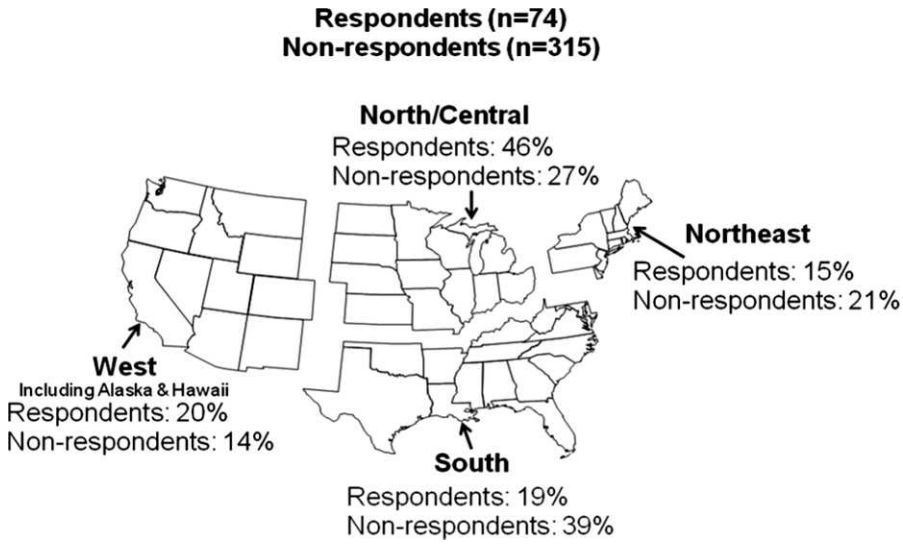

Figure 2.—Respondent and nonrespondent headquarter locations by region.

between $11 million and $25 million, and 1 percent indicated their total gross sales were between $101 million and $250 million.

The number of permanent employees is another metric used to determine company size and viability in the marketplace. Almost two-thirds (62%) of respondents' companies have 10 or fewer employees. Seventeen percent of respondents employ between 26 and 50 people, with the remaining employing between 11 and 25 people (7%), between 51 and 100 people (7%), and between 101 and 500 people (7%). Respondents were also asked to indicate percentage of male and female employees. Overall, for all respondents combined, 78 percent of total employees were men and 22 percent were women.

We were also interested in age and education profiles of company employees. On average for all respondents, 49 percent of company permanent employees were older than 50 years old, 19 percent were between 41 and 50 years old, 20 percent were between 31 and 40 years old, and 12 percent were between 20 and 30 years old. With regard to education, on average for respondents, 13 percent of all employees did not graduate high school, and 42 percent received a high school degree. Twenty percent of employees had some college, while 20 percent graduated with an undergraduate degree (BA/BS). Finally, 5 percent of respondent employees completed an advanced degree (Master's, PhD, JD, and MBA).

Innovation deconstruction

Based on the literature, we deconstructed innovation into three broad elements: product, (production) processes, and business processes (which we name company culture; Price 2007). Product innovation refers to improvements of existing products or developing new products, while process innovation broadly describes operational improvements that lower production costs, reduce delivery time, and/or increase flexibility in the production process (Boer and During 2001). Desphandé and Webster (1989) reviewed several studies and defined organizational (or corporate) culture as ''the pattern of shared values and beliefs that help individuals understand organizational functioning and thus provide them with the norms for behavior in the organization.'' Crespell et al. (2006) suggest that innovation implementation is strengthened in firms that have a market orientation or culture. Cooper (1996) concurs by stating that constant innovation allows a company to better meet consumer needs, stay ahead of the competition, capitalize on strategic market opportunities, and align organizational strengths with market opportunities. Thomas (1995) and Gima (1996) suggest that a market orientation leads to successful innovation and higher level of organizational performance.

Using SPSS statistical software, a principal components analysis (PCA) factor analysis with orthogonal varimax rotation was conducted to determine the relevant items for each of the three innovation constructs in the study. The objective of PCA factor analysis, a data reduction analysis, is not to explain the correlations among variables, but to account for as much variance as possible in the data (Kim and Mueller 1978). The latent root criterion (eigenvalue $\geq$ 1) was used in extracting the factors. Orthogonal varimax rotation was used to disperse the factor loadings within the factors to achieve a more interpretable solution (Field 2000). An iterative process resulted in a reduction from 16 items to 12 items with significant factor loadings that were in turn segmented into three innovation factors. The cutoff point for interpretation of the loadings was ± 0.50 (Table 1). The four items with factor loadings less than 0.50 were ''Percent of 2008 revenue from sales of new/improved products,'' ''Average age of large machinery,'' ''Sets inventory based on customer needs,'' and ''Uses marketing research to determine customer needs.''

These multi-item variables were subjected to scale testing with resulting Cronbach alpha statistics (Table 2). Cronbach's alpha (Cronbach 1951) is a measure of internal consistency, that is, how closely related a set of items is as a group. A ''high'' alpha value is often used as evidence that the items measure an underlying (or latent) construct (SPSS 2011). Technically speaking, Cronbach's alpha is not a statistical test—it is a coefficient of reliability (or consistency; SPSS 2011). Cronbach's alphas are 0.70 for product innovation, 0.76 for production process innovation, and 0.70 for company culture innovation. The value 0.70 is often

Table 1.—Constructs and items.

Product innovation
Unique products not found elsewhere in the market
Cutting-edge designs
Award-winning designs
Introduction of a new products before competitors
Production process innovation
Makes major improvements in current technology
Usage of breaktrough production technology
Production equipment improvement over past 3 y
Production software improvement over past 3 y
Corporate culture innovation
Rapid responding to customer inquiries
Company production is based on customer needs
Customer service level
Importance of developing long-term relationships with customers

Table 2.—Scale reliability analysis (Cronbach's α) of product, production process, and corporate culture innovations.[a]

	Innovation		
	Product	Production process	Corporate culture
Cronbach's α	0.70	0.76	0.70
n	69	71	72
No. of items	4	4	4
Items mean	3.0	2.6	4.6

[a] Scale: 1 to 5 Likert, anchored on importance to company success.

used as the cutoff value for Cronbach's alpha and thus for the reliability of the test.

Testing the model

Results were mixed and generally inconclusive. As shown in Table 3, of the 12 hypotheses tested, 17 percent (2) were directionally as hypothesized and statistically significant, 42 percent (5) were directionally as hypothesized but not statistically significant, 17 percent (2) were not directionally as hypothesized but statistically significant, and 25 percent (3) were not directionally as hypothesized and not statistically significant. One interesting finding is that both hypotheses that were directionally as hypothesized and statistically significant relate to company size and the relationship to production process innovation ($P = 0.033$) and corporate culture innovation ($P = 0.000$); company size was negatively correlated to product innovation. Another finding worth mentioning is that employee age was directionally related (inversely) as hypothesized for all three deconstructed innovation types, although no relationships were statistically significant. Recall that in Østergaard et al. (2008) the dispersion in the age structure of employees in companies they studied had significantly negative impacts on innovation. In retrospect, we may have analyzed age dispersion and had similar results.

Finally, an anomalous result is that employee education level was found to be statistically significant in its relationship to production process innovation and corporate culture innovation *but were not directional as hypothesized*. This would suggest that the companies with more educated employees, on average, could expect to experience lower levels of innovation in these areas, contrary to Lundvall (2002), who acknowledges that education of the employees is an important part of the firms' human capital and found that firms employing people with a higher education are more likely to be innovative.

Conclusions

In this study, we deconstructed the US furniture sector innovation into three components: product, production process, and company culture and tested for correlations between them and three internal company demographic factors (company size, employee age, and employee education) and one external factor (company location population). While scale testing resulted in valid deconstructed measures of innovation, the hypothesized correlations with demographic factors are inconsistent and, in many cases, divergent from results of previous studies. Although disconcerting, this incongruence leads to a positive connotation; we may have uncovered new innovation–demographic relationships by developing new innovation scales. Results also indicate a glaring need to probe

*Table 3.—Pearson correlations and results of hypothesized relationships between drivers and innovation constructs (*n *= 74).*

		Innovation		
	Demographic driver	Product	Production process	Corporate culture
$H_{1a,b,c}$	Company size	Not directionally as hypothesized Nonsignificant	Directionally as hypothesized Significant at 0.05	Directionally as hypothesized Significant at 0.01
	Pearson correlation	−0.228	0.255	0.411
	Significance (2-tailed)	0.058	0.033	0
$H_{2a,b,c}$	Locational population	Directionally as hypothesized Nonsignificant	Not directionally as hypothesized Nonsignificant	Not directionally as hypothesized Nonsignificant
	Pearson correlation	0.001	−0.017	−0.061
	Significance (2-tailed)	0.988	0.885	0.603
$H_{3a,b,c}$	Age of employees	Directionally as hypothesized Nonsignificant	Directionally as hypothesized Nonsignificant	Directionally as hypothesized Nonsignificant
	Pearson correlation	−0.082	−0.147	−0.217
	Significance (2-tailed)	0.501	0.228	0.073
$H_{4a,b,c}$	Education level of employees	Directionally as hypothesized Nonsignificant	Not directionally as hypothesized Significant at 0.05	Not directionally as hypothesized Significant at 0.05
	Pearson correlation	0.191	−0.263	−0.265
	Significance (2-tailed)	0.105	0.025	0.023

further into innovation processes and drivers in the US furniture industry.

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