

PRODUCT DEVELOPMENT IN LARGE FURNITURE COMPANIES: A DESCRIPTIVE MODEL WITH IMPLICATIONS FOR CHARACTER-MARKED PRODUCTS

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ABSTRACT

Previous research has shown that substantial yield improvements are possible when character-marks are not removed from hardwood furniture parts. Attempts to promote increased use of character-marked wood in furniture should be based on an understanding of how design concepts originate and move through the stages of product development. However, very little has been published concerning the product development process in the furniture industry. This study sought to expand knowledge of the activities involved in furniture product development and to explain character-mark decisions in terms of the product development process. Data gathered from in-depth interviews and a follow-up mail survey of large furniture manufacturers were used to develop a 14-stage product development model. While decisions concerning use of character-marks occurred throughout the development process, such decisions were more common as the process proceeded; few companies considered character-marks in the earliest stages of product development. Certain stages in the model emerged as particularly important to character use, such as those involving mock-ups and evaluation of designer sketches. By identifying the activities that take place in these important stages, barriers to acceptance of character-marked furniture can be better understood and addressed.

Keywords: Character-marks, hardwood furniture, product development, product design, triangulation.

INTRODUCTION

Product design has become a topic of increasing importance to product development managers and marketing researchers in recent

years (Bloch 1995). Good design can add value to a product by enhancing appearance, ease of use, comfort, and safety (Walsh 1983), and can be critical to a product's success in the marketplace (Nussbaum 1990). Good design also can be used to help define corporate iden-

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tity and help firms differentiate themselves in highly competitive markets (Kotler and Rath 1984). Product design plays an especially important role in fashion-conscious industries such as wood household furniture. Calantone et al. (1995), for example, found that furniture executives rated *design quality/innovation* as highly important among product development considerations.

The design of a product does not exist in a vacuum. Consideration of product design is part of a broader product development process that encompasses all activities involved in converting new product ideas into products suitable for market introduction (e.g., Black and Baker 1987; Oakley 1984; Oakley and Pawar 1983; Topalian 1980). With furniture, design is a critical product issue that must be considered throughout the product development process as it relates to such attributes as wood species, style, finish, intended price-point, and the manufacturing capabilities of the company. Furniture is a complicated product with many possible feature combinations, serving both functional and aesthetic considerations (Tierney 1995; Bennington 1985).

An example of an issue that can affect furniture design during the product development process is the use of character-marked wood. According to the National Hardwood Lumber Association (1994), character-marks are any natural characteristic of wood such as knots, burls, swirls, bird pecks, color streaks, spots, and light stain. Studies have indicated that substantial yield improvements are possible when character-marks are not removed from hardwood furniture parts (Buehlmann et al. 1998, 1999; Araman 1979). Although knots are often visibly present in pine furniture, the inclusion of character-marks in hardwood furniture is uncommon. Tradition and manufacturers' perceptions of consumer acceptance have been suggested as potential reasons for this lack of character-mark use in hardwood furniture (West 1999). Use of character-marks in hardwood products has experienced increased interest due to uncertainty concerning hardwood lumber quality and cost, and a de-

sire to extend the hardwood resource (Buckley 1996; Wilhelm 1994).

Greater use of character-marked wood by furniture manufacturers represents a new kind of material input into an existing design management process, and thus should be viewed in the broad context of the product development process. Firms demonstrate a tendency to resist change, especially those that have been built around standardized manufacturing processes. Design changes are not always perceived by company personnel as beneficial and may therefore be met with resistance (Oakley 1984; Kotler and Rath 1984). In addition to manufacturing considerations, such as defining and implementing acceptable character-mark standards, furniture producers face decisions concerning the marketing and sales potential of character-marked products. It is therefore useful to investigate how character-marked furniture products might come into existence at large furniture companies. This research was designed to expand understanding of the furniture product development process.

BACKGROUND

The product development process

There are numerous models of the product development process (e.g., Souder 1987; Crawford 1983). Most of these models are presented in a step- or stage-wise manner, and are often generalizations that can vary substantially among companies and industries. Moore (1984), for example, presented case studies of four companies in different industries that revealed four somewhat different versions of the product development process. Rochford and Rudelius (1992) found that many of the medical products manufacturers they surveyed did not participate in all 12 stages of a proposed model developed from the product development literature. Page (1993) found that nearly half of a broad-based sample of companies had no well-defined, structured product development process, although most reported participation in a pre-

determined list of seven general activities related to product development.

Many models of the product development process are similar, however, in terms of the major steps or stages included. The structure of many models includes a starting point such as idea generation or initial market research, followed by product design or development activities. Following such activities are prototype production and market feedback, concluding with introduction of the product into the marketplace. The product development process can vary among industries and individual companies in terms of the stages involved, time length of each stage, stage sequencing, and the total time span involved (Moore 1984).

Given the variability in product development among differing industries, it is important to understand product development activities specific to furniture. Very little empirical research has been published concerning the product development process in the furniture industry. Bennington (1985) offers one of the only published models, a step-wise cycle containing nine steps. While Bennington (1985) is frequently cited in published research as a reference for furniture marketing (e.g., Smith and West 1990; Ozanne and Smith 1996; Michael and Smith 1996), his discussion of the product development process is essentially an overview, with few details concerning the specific activities occurring at each step. However, these activities could contain valuable clues concerning barriers to development of character-marked furniture products.

Product development in the furniture industry

The 9-step Bennington (1985) model provides a framework for a review of what is known about the broad stages of the product development process for furniture manufacturers, as presented below.

Step 1. Product planning committee meetings.—Most furniture companies reach new product decisions via committee. Often, the

product development committee includes the company president, as well as senior representation from manufacturing, design, finance, marketing, and sales (Tierney 1995). An important activity for the committee in the early stages of product development is consideration of new product ideas. There are numerous sources of new ideas for furniture manufacturers. Such sources might include feedback from salespeople, designers, suppliers, retailers, and consumers. Manufacturing capabilities, competitor's products, the need to increase or retain market share, and attraction of media attention are also factors that can stimulate new product development (Tierney 1995; Black and Baker 1987; Bennington 1985).

The triggering factors that initiate searches for new designs have important implications for character-marked furniture, since such products are uncommon. Companies that tend to rely on cues such as popular styles in the marketplace may be reluctant to consider inclusion of character-marks in their products. Bloch (1995) and Solomon (1988) point out that many of the product designs within a given industry tend to exhibit considerable conformity since nearly all companies are using similar market research data.

Step 2. Designers prepare sketches.—Once new product ideas have been identified, designers are called upon to render initial product sketches. Often these drawings will be the designer's interpretation of the new ideas that are passed on from the product development committee. Most furniture designers bring both their design expertise and industry knowledge to bear on a new design project (Tierney 1995). Companies vary in the extent of information that is given to designers for developing preliminary designs. If new product ideas are initially over-specified, the creativity of designers can be hampered (Oakley 1984; Topalian 1980).

Step 3. Designers prepare mechanical drawings.—An extension of the preparation of sketches by designers is the preparation of mechanical drawings. Mechanical drawings are generally made from the best ideas emerging

from the initial sketches, as determined by the product development committee. These drawings form the basis for production of furniture prototypes.

Step 4. Mock-up or prototype construction.—From the mechanical drawings, mock-ups or prototypes are built and presented to the product development committee for evaluation. Mock-ups are furniture samples, containing fronts, tops, sides, but no working parts (Bennington 1985). An important consideration when dealing with prototypes is that they are produced in a customized fashion rather than in situations resembling full-scale production (Oakley 1984). Sample makers often have their own shops away from the actual production line (Bennington 1985). Full-scale production feasibility must therefore not be overlooked when evaluating prototypes.

Step 5. Product planning committee review.—Mock-up evaluation generally entails a review by the product development committee. The committee determines from the mock-ups which pieces are most salable, and determines an initial price (Bennington 1985). Since companies generally specialize in production of furniture at specific price-points (i.e., low, medium or high), new furniture groups are designed and produced at a targeted price-point. Retailers' acceptance of the product at the selected price-point will be determined at later stages of the process (Sinclair 1992; Skinner and Rogers 1968). Since furniture products tend to be grouped into price-points, product differentiation becomes very important within any given price-point category (Sinclair 1992; Bennington 1985).

Step 6. Premarket reviews.—Most large furniture manufacturers participate in a function known as premarket, an event where major retailers are invited to come to manufacturers' showrooms and view mock-ups of proposed new products. Retailers provide feedback concerning the new products and might place orders for finished shipments (Bennington 1985). Retailers place about 6% of their yearly orders during premarket activities (Michael and Smith 1996).

Step 7. Display of new product at market.—Showings at a furniture market are the next step in the Bennington (1985) model. Furniture markets are a type of trade show where manufacturers exhibit new products in showroom settings to retail buyers. Manufacturers generally maintain permanent showrooms at the market sites. There are several major furniture markets held throughout the United States, most occurring biannually. Major markets are held in Atlanta, Dallas, Chicago, San Francisco, and High Point, North Carolina, the latter being the world's largest (Sinclair 1992). Approximately 51% of retailers' yearly orders are placed during and within six weeks after market (Michael and Smith 1996).

Step 8. Evaluation of orders after market.—Retailer response to new products is evaluated after showing at a market. Individual pieces or entire groups that generate little interest during or immediately after market showing may not be manufactured due to a lack of profit potential (Bennington 1985).

Step 9. Full production.—If new product samples generate adequate interest at market, full production is scheduled. Case goods companies can vary, however, in their production and warehousing strategies. Some companies may choose to produce a certain number of cuttings of a new group and then sell from warehouse inventory, whereas other companies may produce cuttings only to fill orders with little or no warehousing (Bennington 1985).

The preceding review portrays a general picture of furniture product development. The objective of this work was to expand knowledge of the specific activities involved in the product development process for large case goods manufacturers. Of particular interest was a determination of how these activities affect the development of character-marked products.

METHODS

Data collection

Population of interest and sample frame.—The population of interest for this study was

large case goods manufacturers in Virginia and North Carolina. Large companies were chosen because such companies offer the greatest opportunities for large-scale use of character-marked wood. The study region was chosen because of the concentration of major case goods manufacturers located in this area, in proximity to the influential High Point furniture market. According to *Furniture Design and Manufacturing* (1997), approximately one-sixth of the 300 largest (based on sales) North American furniture (e.g., residential wood and upholstery, office, contract) and cabinet companies have their headquarters in the two-state region of North Carolina and Virginia, and this proportion is higher when only case goods are considered.

The sample frame was generated from the *Furniture Design and Manufacturing* (1997) list of the 300 largest North American furniture manufacturers. The smallest company in this list had sales of \$12 million in 1996. Companies appearing in this list that produced dining room and/or bedroom furniture (i.e., case goods) from hardwoods and that were located in North Carolina or Virginia served as the sample frame. The initial sample frame consisted of 31 companies. In the process of arranging interviews, it was determined that four companies did not belong in the sample frame, resulting in a final sample frame of 27 companies.

On-site interviews.—Data for model development were gathered during on-site, semi-structured, tape-recorded interviews with representatives from 14 of the companies in the sample frame. An additional interview was conducted via telephone, and another was conducted on-site, but was not recorded. This resulted in a final sample of 16 companies, most of them representing nationally prominent brands. Persons targeted for interviews included vice-presidents and managers of marketing, sales, or product development, and were nearly always members of their respective company's product development committee. Table 1 shows the titles of the company representa-

TABLE 1. *Number of company interviews by position.*

Position	Number of interviews
VP/Manager of Merchandising	5
VP Sales/Sales Manager	4
VP/Director of Product Development	3
VP of Marketing	2
Assistant—Product Development	1
Designer (in-house)	1

tives interviewed. The average length of the recorded interviews was 38 minutes.

A broad range of product price-points was represented among the sample companies, ranging from low-medium to high. Most firms, however, were in the middle to upper-middle. There was also variation among the sample companies regarding the primary type of furniture construction used in their respective product mixes (i.e., companies with all solid wood product lines, companies with all veneer product lines, companies with a combination of solid wood and veneer product lines).

Mail survey.—A mail survey of the entire sample frame was conducted once the interviews were completed and analyzed. A questionnaire was developed to provide quantitative measures to supplement the primarily qualitative interview findings. Respondents were asked:

- to rate the extent to which their company participated in the stage-specific product development activities that emerged from the interviews;
- to indicate which stages in the model generally included character-mark decisions;
- to indicate which stage was the most critical when deciding whether to use character-marks in a new furniture group; and
- to indicate whether the marketing/product development function or the production/manufacturing function had more influence over product development issues found in the interviews to be associated with use of character-marked wood.

Both interviewed ($n = 16$) and noninterviewed ($n = 11$) companies were included in the mail survey sample frame. The interviewee at each company was targeted for the mail questionnaire. For noninterviewed companies, the original contact person was targeted. Thirteen responses were received from the 16 interviewed companies; 11 were usable and 2 were unusable (in one case the original contact had left the company and in another case the company had gone out of business since the time of the interview). Five responses were received from the 11 companies that were not interviewed, and 4 were usable. In sum, 15 usable questionnaires were received.

Data analysis

Nonresponse bias.—A check for nonresponse bias was possible since questionnaires were received from both interviewed and noninterviewed companies. Three measures, including number of employees, operating price-point, and total number of designers employed and/or retained, were used to compare interview respondents to interview nonrespondents using nonparametric Mann-Whitney *U*-tests. None of the tests was significant ($P = 0.34$ for number of employees, $P = 0.71$ for price-point, and $P = 0.11$ for number of designers), suggesting that respondents did not differ significantly from nonrespondents.

Model development.—The base interview question for development of the model asked respondents to describe the steps involved in moving a new product from an idea to a tangible good at their respective company. Additional information regarding the process was gained from related questions involving such issues as design strategy, sources of new product ideas, and the internal structure of the company. The companies' experiences regarding character-marks and physical distressing were also discussed in the context of the product development process.

When dealing with qualitative data, it is useful to provide a clear explanation of the procedures used in analysis (Kvale 1996). In

the present study, a base model of the product development process was developed after reading and becoming familiar with the data collected during the interviews. To accomplish this, a data form was developed to keep track of companies reporting participation in specific product development stages and stage activities. Only the most salient stages and activities were initially recorded. Qualitative data are advantageous in that research questions can be studied in depth with no predetermined categories of analysis—such categories often emerge from the data (Patton 1990). No reference was made to the Bennington (1985) model during the interviews.

Once the base model was developed, each company case was carefully compared to the base model, with "hits" to existing stages and stage activities being recorded in the form of frequency counts. If a company case revealed a stage or activity not included in the base model, that stage or activity was added to the model. Then subsequent companies mentioning the added stage or activity were counted and recorded. This process continued until the data from all 16 companies were analyzed.

Triangulation.—Results from the interviews were compared to results from the mail survey to provide a measure of validity for the model. The use of triangulation, or dissimilar approaches of investigating the same phenomenon, provides a means of overcoming the limitations inherent to any single type of methodology (Singleton et al. 1993; Patton 1990; Jick 1979). While the method of qualitative interviewing can result in data that are subjective and difficult to analyze, it allows for in-depth understanding of specific experiences and perspectives. The intent was to discover as much detail as possible about the product development process for a limited group of prominent companies. The model that emerged from the interviews, rather than being the end product, was converted into a quantitative questionnaire format and tested with the sample frame members, many of which were involved in development of the original model. The extent to which the find-

TABLE 2. *Stages in the product development process with number of companies reporting, and comparison with Bennington's (1985) model.*

Stage number and description	Number of companies reporting	Corresponds to Bennington's
1. Identification of opportunity/need for new products	14	Step 1
2. Generation of new product ideas	14	Step 1
3. New product information given to designers	15	Step 1
4. Designer activities	15	Step 2
5. Initial new product review	15	Step 2
6. Additional designer activities (e.g., specs for approved designs)	6	Step 3
7. First intermediate new product review (based on designer specs)	2	—
8. Mock-up construction/manufacturing issues	13	Step 4
9. Second intermediate new product review (based on mock-ups)	11	Step 5
10. Remaining group pieces sketched by designers	4	—
11. Final new product review (i.e., premarket)	9	Step 6
12. Prepare for market (using feedback from premarket)	10	—
13. Market	16	Step 7
14. Product manufactured/orders filled	10	Steps 8, 9

ings were similar was an indication that the model was valid and that the interview data were correctly interpreted. The result was an in-depth account of product development for large furniture companies.

RESULTS

A model of the product development process

Table 2 presents a 14-stage descriptive model of the product development process for large furniture manufacturers, based on data collected during the interviews. The number of respondents reporting a stage during the interviews indicates the extent of support for the stage. Several of the stages confirm those discussed by Bennington (1985), but a few additional stages emerged, and the organization of the two models is not always identical. With the exception of Stage 12 (*Prepare for market*), the new stages suggested by the present research seem to be relatively minor in importance based on the number of companies reporting the stage. The model presented here also tended to break out the early stages of product development into finer units. It is important to note that the stages presented in Table 2 represent categories that emerged from interview situations where respondents were provided with no preconceived model as a reference for discussion. In this context,

the resulting consistency with the Bennington (1985) model suggests converging evidence.

Table 3 shows the mean scores, based on the questionnaire data, for activities included in the investigated stages of the overall model.¹ Most of the means were relatively high (i.e., 5.0 or greater on a 7-point scale), suggesting that the stage activities developed from the interviews were indeed common.² If an activity with a high mean also had a high frequency count from the interviews, there was evidence of convergent validity between the two measures. The extent of association between the interview and questionnaire measures was estimated with Spearman's rank correlation coefficient. The correlation

¹ To reduce questionnaire length, a subset of stages was selected for further investigation. Since many of the activities most relevant to character-mark decisions occurred in the earlier stages of the model (based on the interviews), only the first nine stages were included. Stage 9 was selected as a cut-off because of the drop in the number of companies reporting Stage 10, and the shift in focus to furniture markets that begins at Stage 11. Also, Stages 6 and 7 were excluded due to their relative unimportance.

² Only stage activities that at least three companies reported in the interview data were considered. Although this criterion was established somewhat arbitrarily, it was viewed as indicative of a common activity based on the open-ended nature of the interview questions. Using this criterion, 26 activities were included and 8 were excluded. The average activity was reported 5.4 times.

TABLE 3. *Product development activities and character-mark decisions, by stage.*

Stage and stage activity	Mean ¹ (SD)	Character-mark decisions occur at this stage ²	Stage most critical to use of character-marks ³
Stage 1—Identify opportunity/need for new product		13%	0%
Learning of popular style categories in the marketplace (8) ⁴	6.3 (1.2)		
Determining voids in existing product lines (5)	6.8 (0.4)		
Looking at competitors' products within targeted style categories (5)	5.8 (1.1)		
Formation of basic product concept or theme (4)	6.0 (1.1)		
Stage 2—Generation of new product ideas		47%	0%
Travel by product development or marketing personnel (9)	6.3 (0.9)		
Feedback from retailers/dealers (6)	5.9 (1.1)		
Seeking input from designers (6)	5.9 (1.2)		
Feedback from sales representatives (5)	4.7 (1.7)		
Reading various forms of printed media (4)	5.3 (1.8)		
Stage 3—New product information given to designers		73%	13%
Desired style category given to designers (8)	6.5 (0.7)		
Desired finish given to designers (5)	4.9 (1.2)		
Desired geographic market region given to designers (5)	3.4 (2.2)		
Desired wood species given to designers (4)	5.6 (1.1)		
Desired price-point given to designers (3)	5.2 (1.4)		
Stage 4—Designer activities		87%	20%
Sketches/drawings of proposed designs prepared by designers (12)	6.6 (0.7)		
Product characteristics suggested by designers (7)	6.1 (0.9)		
Manufacturing capabilities of the company considered by designers (4)	5.8 (1.1)		
Stage 5—Initial new product review		87%	27%
Product development committee reviews designers' sketches (11)	6.5 (0.8)		
Determination of product characteristics by product development committee (8)	5.9 (1.4)		
Manufacturing representatives review designers' sketches for production feasibility (8)	4.7 (2.1)		
Stage 8—Mock-up construction/manufacturing issues		93%	33%
Mock-ups are built (13)	6.7 (0.7)		
Manufacturing feasibility determined during mock-up construction (6)	6.4 (0.9)		
Manufacturing alterations made to new designs to increase ease of manufacture (5)	6.5 (0.6)		
Stage 9—Intermediate new product review (based on mock-ups)		100%	7%
Product characteristics visibly reviewed by product development/marketing personnel (8)	6.9 (0.4)		
Product alterations made to enhance the desired look of the group (4)	6.7 (0.5)		
Price established for the new group (3)	5.2 (1.7)		

¹ Based on the following questionnaire scale: 1 = "never included at this Stage" to 7 = "always included at this Stage."

² Proportion answering "yes" on the questionnaire to dichotomous question asking whether decisions concerning use of character-marks/physical distressing were generally involved at the Stage.

³ Proportion indicating on the questionnaire that the Stage was the "most critical" when deciding to include character-marks in a new furniture group.

⁴ Number of companies mentioning the activity during the interviews.

between the number of times an activity was mentioned in the interview data and its average rating from the questionnaire data was statistically significant and moderately high at $r_s = 0.48$ ($P = 0.01$, two-tailed). This suggests that the model developed in this study provides a valid framework for discussion of

character-mark usage in the product development process.

Character-marks and the product development process

On the questionnaire, respondents were asked to indicate, for each stage, whether the

stage generally involved decisions concerning use of character-marks, and to indicate which stage was the single most critical when making character-mark decisions. The occurrence of decisions concerning character-mark use increased monotonically as the product development process proceeded (Table 3). By the time designers were involved at Stage 3 (*New product information given to designers*), 73% of the companies indicated that character-mark decisions had occurred, increasing to 100% by Stage 9 (*Intermediate new product review*). Regarding the most critical stages to character use, 33% of respondents indicated that Stage 8 (*Mock-up construction/manufacturing issues*) was the most critical to character-mark decisions, while 20% and 27% indicated that Stage 4 (*Designer activities*) and Stage 5 (*Initial new product review*) were the most critical, respectively.

Using Table 3, it is possible to determine the most common product development activities occurring in stages important to character-mark use. It seems character-mark decisions increase substantially at Stage 3 (*New product information given to designers*), which is the point where character-marks can enter the product development process as a potential product characteristic, along with ideas on prospective styles, finishes, and wood species. This finding suggests that product development personnel often have some desire that designers consider character in their early product renditions. However, designers themselves can be important initiators of character-mark use, as indicated by the 20% of the sample that cited Stage 4 (*Designer activities*) as the most critical to use of character. Thus designers might be effective targets for promotion of character-marked wood, given that designers appear to make new product suggestions at Stage 4 and are sought for new product ideas at Stage 2 (*Generation of new product ideas*).

Stage 5 (*Initial new product review*), which revolves around evaluation by the product development committee of designers' proposed sketches or drawings, was somewhat critical

TABLE 4. *Extent of influence by functional area over product development issues involving use of character-marked wood, and results of Kruskal-Wallis test.*

Product development issue	Mean ^{1,2}	(SD)
a) Finish used	2.4	(0.9)
b) Wood species used	1.8	(1.5)
c) Decision to include character-marks	1.7	(1.3)
d) Size of the character-marks used	1.4	(1.5)
e) Lumber/veneer grade used	-0.1	(2.0)

¹ Based on the following scale (the scale values to the left of "0" were coded as negative when calculating means, therefore, a positive mean indicates more influence by marketing/product development):

Manufacturing/ Production has more influence	Equal influence	Marketing/ Prod. Dev. has more influence
3 2 1	0	1 2 3

² Kruskal-Wallis $H = 15.6$ ($p < 0.01$). Based on post hoc comparisons (Mann-Whitney U tests with $\alpha = 0.05$), there are three groups: (a,b,c), (b,c,d), and (e).

to character-mark decisions. Common activities occurring during this stage include meetings by the product development committee, determination of product characteristics such as finish, hardware, and wood species, and to a lesser extent the manufacturing feasibility of the proposed designs. Character-marks are important in this stage to the extent that they are a distinguishable product feature that will potentially interact with the other features of the new group. The committee must make an initial determination of what character-marks will contribute to the overall look or feel of the group.

The stage most critical to character-mark use appeared to be Stage 8 (*Mock-up construction/manufacturing issues*). Construction of mock-ups, determination of manufacturing feasibility, and design alterations that account for potential manufacturing problems are common during this stage. This suggests that there are manufacturing considerations associated with character-marked furniture, and that mock-ups are quite important to character-mark decisions.

Functional area involvement with character-marks

Table 4 shows that the marketing/product development function generally exerted more influence over use of character-marks than did

the production/manufacturing function. Of the five product development issues investigated, only *lumber/veneer grade used* did not emerge as being influenced more by the marketing/product development function. Thus, arguments involving potential yield improvements (i.e., a production issue) alone are not likely to be sufficient to encourage increased use of character-marks by large furniture manufacturers. It should be noted, however, that these results reflect the perspective of marketing and product development personnel.

DISCUSSION

Importance of mock-ups to character use

An apparent discrepancy exists in the results concerning functional area involvement with character-marks. While Table 4 indicates that involvement of the manufacturing/production function is somewhat minor, the model suggests that Stage 8 (*Mock-up construction/manufacturing issues*), an apparently manufacturing-based stage, was the single most critical stage to character-mark use. This result might be a reflection of the importance of mock-up evaluation to character-mark use, although mock-up evaluation notionally occurs in the next stage (Stage 9). One respondent equated mock-up evaluation with “kicking the tires,” and suggested that no amount of prior planning can indicate how character-marks will look on a new product until there is a tangible product to observe (as opposed to drawings). It also seems this is where the production feasibility of character-mark use comes into play, no matter where the idea originated or how accepted the concept. These findings suggest the importance of both marketing and manufacturing considerations to character-mark use, even if the marketing function generally has more influence over determination of product characteristics. Construction and evaluation of mock-ups seem to be an important point of interaction between the marketing and manufacturing functions.

Strategies for increasing use of character

A potentially useful strategy for encouraging use of character-marked wood is to increase promotion of character-marked products among the sources of new product ideas for furniture companies (i.e., Stage 2). This would result in character-marks being considered in the earliest stages of product development, which currently does not seem to be the case. Increased commitment to character as a product feature might be achieved if it originates as part of the initial product concept. This research indicated that there are many sources of new product ideas for furniture companies, ranging from primary sources like direct feedback from retailers, designers, and sales representatives to secondary sources like printed media (e.g., home magazines) and travel (e.g., antique stores). While the primary sources focus chiefly on what is selling or popular in the marketplace, secondary sources like printed media outlets could be used to reach product development personnel and promote use of character-marked wood.

Some companies expressed instances of frustration over deciding against a somewhat innovative design idea, like character-marks, only to find that another company had successfully developed a similar product. Thus, manufacturers might be encouraged to become less risk-averse and let character-marked groups pass through the design and mock-up evaluation stages of development (i.e., Stages 5 and 9) even if there are reservations among the product development committee about the fit with what the company has traditionally produced. While no company can afford to consistently attempt to sell products that receive a high degree of complaints from customers, increased time to develop market acceptance may be necessary and would allow large companies to achieve an acceptable level of character-marking in new furniture products.

Contributions and limitations

From a theoretical standpoint, the Bennington (1985) model was verified and expanded

by the present research. This work adds to a relatively small research base concerning product development in the furniture industry. A contribution of the present research was a detailed account of the specific activities involved in furniture product development, which allowed for a better understanding of the issues surrounding the design and development of character-marked hardwood furniture.

It should be kept in mind that this study involved only large furniture companies. The product development process might be different for smaller companies (e.g., fewer stages). Also, due to the geographic area of interest, most interview discussions of premarket and market were based on the furniture market at High Point, which occurs biannually in April and October. Thus, most new product introductions are planned for these events. It should also be noted that a lack of support for a stage or activity in terms of the interview data might reflect a lack of salience in the mind of the respondents more than a lack of existence. For example, Stage 6 (*Additional designer activity*), which involves designers' making mechanical drawings of approved designs, was reported by six companies. It is likely, however, that most if not all companies participate in such a stage.

The participants in this study were involved primarily in marketing activities. This fact raises the possibility that the role of marketing in the product development process may have been overemphasized. Clearly, manufacturing considerations have a role in the development process and this was evident in the model. Manufacturing involvement first appears at Stage 4, where designers often take the manufacturing capabilities of the company into consideration. Manufacturing representatives are common participants in Stage 5, where they sometimes serve on the product development committee and are active in reviewing designer sketches along with marketing personnel. Stage 8 is a manufacturing-based stage, where design alterations are frequently made based on mock-up production. As one

respondent expressed, "we are not going to do a suite the manufacturers do not want to do." Another respondent indicated that entire new designs are sometimes discarded at this point if manufacturing alterations result in a loss of the intended look of the group. These examples suggest the importance of early involvement by manufacturing. The model uncovered by this work suggests an interactive and sometimes iterative approach to product development, involving both marketing and manufacturing considerations. Thus, a study focusing on the manufacturing perspective of furniture product development undoubtedly would add new insights, such as the degree to which the marketing and manufacturing functions share mutual goals and concerns in the process.

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