

COMMUNICATION AND RELATIONSHIPS BETWEEN INDUSTRIAL DESIGN COMPANIES AND THEIR CUSTOMERS

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ABSTRACT

This paper examines the nature of relationships and communication modes between US companies in the industrial design sector and their clients. Evidence from a survey of 85 industrial design firms suggests that most of these companies have cultivated close relationships with their customers, and that trust-based relationships are an important contributor to business success. The evidence also suggests that the most successful firms are those that serve non-local markets. Services provided by the industrial design firms integrate all elements of production processes ranging from conducting research, developing existing or emerging products, making final products, to marketing the products. This small sector of the economy offers knowledge-based inputs that are critical to the business performance of both US and foreign manufacturing firms. It is argued that while modern technology rapidly changes the way companies interact with their customers, face-to-face contact between firms and their clients is necessary for relationship-building and long-term success.

Key words: U.S. industrial design sector, face-to-face contact, trust-based relationship.

INTRODUCTION

In recent years, there has been a fast growing trend among industrial firms to hire external sources of technical expertise to support new product development (Beeseley and Rothwell, 1987; Chandra and MacPherson 1994; Hagedoorn 1996, 2002; O'Connor 1996; Coffey and Drolet 1996; MacPherson 1997a). For mature industrial economies such as the United States, a focus upon excellence in product design could improve the sales prospects of import-competing firms in sectors such as apparel, children's toys, and hand-held machine tools (Chandra 1992). External design consultants, for example, were hired by Apple Corporation to develop innovative products including iPod and several other gadgets (Economist 2007). This is not a new phenomenon and has been practiced by major corporations such as Proctor & Gamble, BT, and several drugs giants, all of which have realized the power of admitting that not all good ideas start at home (Economist 2007). Effective design is fundamental to the production system because it can reduce production costs by increasing the overall efficiency of the production process (Bryson et al. 2004). Indeed, design is a complex activity that involves innovation, change, invention, and creativity. These are the fundamental elements which contribute to the development of new products or the modification of existing products (Bryson et al. 2004).

Aside from the benefits generated from using external expertise such as design services, high transaction costs associated with acquiring external technology, lack of control in the innovation process, low incentive for efficiency and effectiveness, and conflicts among partners during development as well as commercialization are some of the disadvantages of accessing external sources of innovation (Chiesa et al. 2004). It is commonly agreed that firms should not

outsource core products/services that they deem to be of strategic importance. For industrial design services, the evidence is quite the opposite. Manufacturing firms are increasingly employing industrial design firms to assist them with their core products. In fact, rather than just subcontracting elements of the manufacturing process, companies are now subcontracting a substantial part of the knowledge component of their complete products to independent business service companies (Bryson et al. 2004).

Obviously, for any firm to subcontract its core services to an external firm, a close and trusting relationship must be enforced to avoid a critical mistake that could damage the survival of either firm. Trust has been viewed as beneficial to all parties involved, regardless of their exchange settings (Schurr and Ozanne 1985; Barney and Hansen 1994; Hosmer 1995; Das and Teng 1998; Sheppard and Sherman 1998). In other words, whether it is a business or personal encounter, trust positively helps shape and determine the existing and future relationship between or among the parties involved. So, how big is the U.S. industrial design industry? What kinds of relationships do industrial design firms have with their clients? What are their main communication modes and how important are they? Is locating in close physical proximity to client firms important? Is face-to-face contact important?

Little empirical research has been conducted on a firm level in the industrial design sector. Several economic geographers have drawn attention to the need for empirical work in this area (e.g. MacPherson 1997; Beyers 2003), yet this sector remains under-explored in the United States. Many studies have called for in-depth and specific research on innovation and services in terms of their linkages and relationships (Tether et al. 2001; Chiesa et al. 2004; Drejer 2004). Chiesa et al (2004) calls for in-depth studies focusing on companies that offer services for

new product development, from concept definition through design, engineering, prototyping, and laboratory testing to final commercialization and marketing. Bryson et al. (2004) indicated that changes in the nature of manufactured goods affect both the internal organization of manufacturing and service companies as well as their relationships with other organizations such as suppliers and competitors. These changes may well be reflected in the formation of new and geographically different clusters of economic activity or patterns of inter-industry linkage which have hitherto been overlooked (Bryson et al. 2004). In summary, because of increasing national and international competition, the growing utilization of modern technology (e.g. e-mail and the internet), and a general lack of firm-level empirical research on the industrial design sector, this paper seeks to address the above questions by examining the results from a national survey of 85 US industrial design companies.

RESEARCH CONTEXT

The Industrial Design Society of America (IDSA) estimates that industrial design services accounted for around 15% of total US business, professional, and technical service exports in 2004. Using this estimate and the real dollar values of the total US business, professional, and technical service imports and exports provided by the U.S. Department of Commerce, exports of industrial design services accounted for \$6,592 million in 1997, rising to \$10,456 million in 2003. Similarly, imports of industrial design services almost doubled from \$3,184 million in 1997 to \$6,126 million in 2003. The primary markets for US design exports are the UK, France, Italy, Canada, Japan, and Australia (in rank order). Similarly, these nations are also the main sources of US design imports. Increasing international trade signals both growing global competition and opportunities for industrial design services. However, little is

known about the firms that provide these types of services in the USA.

There are around 1,600 industrial design firms in the USA employing an average of fewer than 20 employees (US Census Bureau 2005). Industrial design firms are professional companies that create and develop concepts and specifications that optimize the function, value, and appearance of products and systems that relate most directly to human characteristics, needs, and interests (IDSA 2003, Bryson et al. 2004). The vast majority of firms in the industrial design sector have only one business location. In addition, thirty percent of all industrial design companies in the USA are one-person units that offer highly specialized services (IDSA 2005).

Geographically, industrial design firms are quite concentrated based on their service types. The cities with the highest number of industrial design establishments from 1998 to 2002 included Chicago, New York, Los Angeles, Long Beach, Detroit, and Boston (Vanchan 2006). Textile design services are commonly provided by design companies located in New York and California, whereas heavy machinery and other types of tooling design services are provided by companies located in Michigan, Ohio, Illinois, Texas, New Jersey, Pennsylvania, and Georgia (Vanchan 2006). With New York City and Los Angeles being the fashion centers, and Michigan, Ohio, Pennsylvania, and Georgia concentrating on machine tools, proximity to customers and manufacturers seems to be an obvious locational factor.

From a regional standpoint, employment in the design industry is focused in a small number of states (U.S. Census Bureau, 2006). The top ten states, according to the latest Census data in 2002, accounted for over 70% of total employment, with a notable

concentration of firms in California (18.0% of total jobs), New York (9.9%), Michigan (7.2%), Florida (5.9%) and Illinois (5.2%). For the top three states, 86 new establishments were added from 1998 to 2002 (47 in California, 28 in New York, and 11 in Michigan). An implication is that the design industry contains a large number of young firms. In California alone, for instance, approximately ten new design firms have been starting business each year since the late 1990s. Although most of these new firms are small (i.e. < 5 employees), such firms can grow over time.

According to the Industrial Design Association of America (IDSA, 2003), one of the primary responsibilities of a design consultant is to create product specifications for goods that can be easily manufactured, look attractive, and work well. This means that designers typically operate across many spheres, including production-engineering, aesthetics (artistic creativity), and ergonomics (functionality). The goal is to come up with a blueprint for an item that can be easily made with respect to the tooling characteristics of the client, as well as an item that is aesthetically appealing. When a company subcontracts design services to a professional consultant, the expectation is for an output that scores highly across these types criteria. But why would any manufacturing company want to outsource design?

Many studies have explored the motivations behind the externalization of services (e.g. Coffey and Bailly 1991, Coffey and Drolet 1996, Beyers and Lindhal 1996, Standifird and Marshall 2000, Howells and Tether 2004), which can be concluded as based on both transaction costs and resource-based theories (Vanchan 2006). Specifically, the outsourcing of design services by the US industrial firms has been driven by a mixture of strategic necessity and opportunism. According to Vinodrai (2006),

although three-quarters of designers whom she interviewed in Toronto (Canada) began their careers with some form of disciplinary-specific formal education at either the college or university level, a majority of them first started working for other industries and then for a number of employers before they assumed senior positions or started their own studios or businesses. Design-related employment as a percentage of total employment in the US commercial aerospace dropped from 9% to 3% between 1994 and 2004, largely because of layoffs and attrition (Pritchard and MacPherson 2007). Kalafsky (2006) notes that US producers in the machine tool industry are simply unable to attract or retain young people with design-related training. It is not surprising to find that industries that face cyclical demand are not very attractive to young graduates with design skills. Most of these people either join existing consultancies or establish their own companies. As a result, lack of internal expertise forces many manufacturing firms to outsource their design services.

From an *opportunistic* perspective, outsourcing design contributes to major cost savings. As a result, a growing number of US companies are outsourcing designs of their products to other companies (including competitors) in order to churn out products at high speed and low cost (Deutsch 2004). For example, Honeywell contracted IBM to design many of its core processors that go into its fighter jet displays (Deutsch 2004). General Motors Shanghai asked Visteon to design much of the interior of its high-end cars which now sell in China (Deutsch 2004). In outsourcing part of its Boeing 787 wing structure and fuselage, Michael J. Denton, vice president of Boeing Commercial Airplanes Engineering, stated that 'Boeing will always design the airplane's basic shape, but have realized that they don't have to design every detail' (Deutsch 2004). External contracts of industrial design services are usually performance-linked,

meaning that design firms get paid very little or do not get paid until the subcontractor starts to earn profit on the project. Some of the initial start-up costs for new product or component development programs are transferred to them from the manufacturers. This is a risky business, but the long-run dividends can be substantial (Vanchan 2006).

Industrial design firms pursue an innovation strategy called 'technology brokering' by combining old ideas in new ways, developing strong social networks both within and outside their groups rather than nurturing individual geniuses, and drawing themselves extensively from the existing work of the operating divisions (Hargadon 2003). They can also be described as knowledge brokers, spanning multiple markets and technology domains. They innovate by brokering knowledge from where it is known to where it is not (Hargadon 1998). In summary, whether for new or improved products, it is apparent that industrial design firms offer a gamut of knowledge-based services that contribute to the innovation efforts of their clients.

With many plausible outcomes from outsourcing of services, there are serious risks associated with outsourcing strategic functions such as design (Hoecht and Trott 2006). Outsourcing design services means that firms are subcontracting a substantial part of the knowledge component of their complete products to independent business service companies (Bryson et al. 2004), which involves a transfer of both codified and tacit knowledge to the outside supplier (Vanchan 2006). Tacit knowledge is an internal asset that most firms want to keep secret. Why would any firm want an external organization to access this knowledge? There are two possible answers to this question. The first reason lies in the repeat-business nature of design services. For example,

Vinodrai (2006) found that design careers in Toronto are characterized by repeated collaboration and joint career paths. Moreover, the career paths of designers are intricately interwoven with one another, building a repertoire of shared experience and institutional common ground (Vinodrai 2006). The second reason that explains the outsourcing of core design rests on the basis of trust-based relationships between industrial design firms and their clients. Designers also build long-term relationships with other designers whom they collaborated or worked with throughout their careers (Vinodrai 2006). These relationships often lead to employment and additional work for the designers (Vinodrai 2006). The advantage is likely to be sustainable if a firm can generate competitive advantage through cooperative buyer-supplier relations (Mudambi and Helper 1998). Moreover, trust, in any sort of exchange, is a source of advantage (Schurr and Ozanne 1985; Barney and Hansen 1994; Hosmer 1995; Das and Teng 1998; Mudambi and Helper 1998; Sheppard and Sherman 1998).

Goe et al. (2000) suggest that more advanced services, such as industrial design services, exhibit lower levels of contact sensitivity because of their long duration and high cost. In addition, the need for face-to-face interaction varies directly with the technological intensity of the client sector, in terms of service delivery modes (Goe et al. 2000). On the other hand, many scholars suggest that face-to-face contact is key to advanced service provision despite the potentially moderating influence of new information technology and the internet (Gertler 1995; Bennett and Robson 1999; Byers 2003; Chiesa et al. 2004; Storper and Venables 2004).

Based on the above discussion and studies, it is evident that outsourcing of industrial design services has increased nationally and

internationally. As noted earlier, this outsourcing trend is driven by a mixture of strategic necessity and opportunism. The geographic proximity between firms and their clients appears to be the rational location choice. Is this true for the US firms in the industrial design industry? What are their main client sectors? Where are their clients located? On the other hand, although many studies agree that communication is a key to any successful business relationship, they do not necessarily agree on the modes of communication between firms and their clients. Does the need for face-to-face contact in the design business vary directly with the technological intensity of the client sector? The following sections describe the results of a firm-level survey which was conducted to supply answers to the questions set forth above.

SURVEY METHODOLOGY

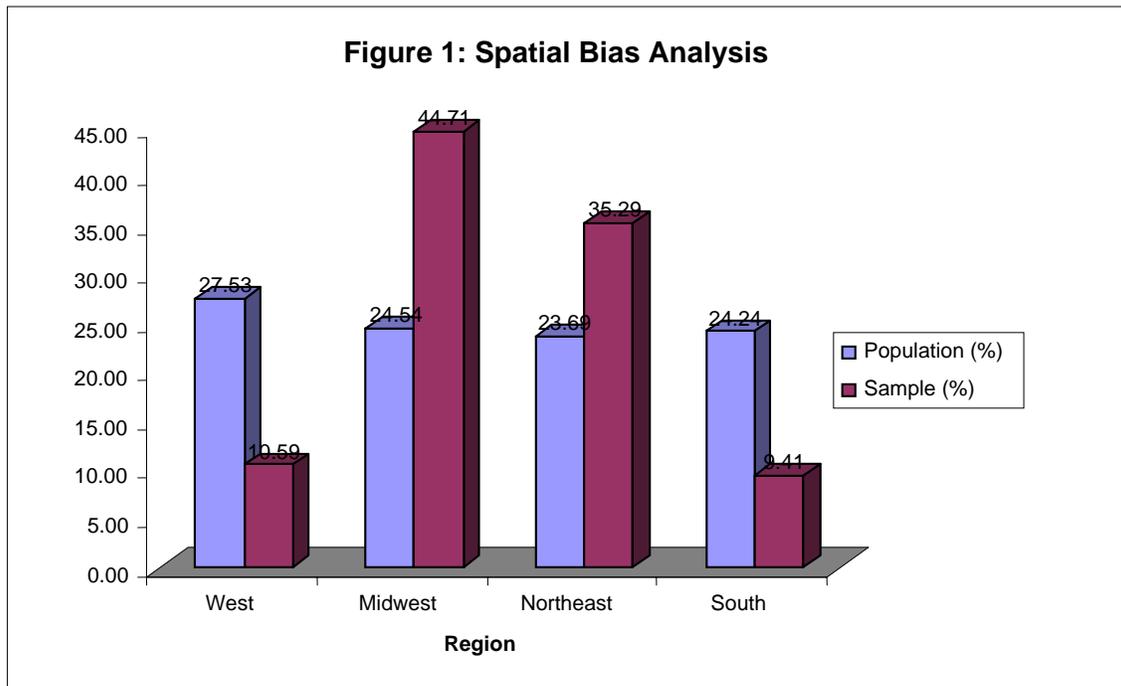
A list of industrial design companies was extracted from Reference USA (www.referenceusa.com), which is a databank organized by North American Industry Classification System (NAICS) codes. Industrial design has 54142 or 541420 as its NAICS codes. The official NAICS definition of the industrial design sector is 'an industry that comprises establishments primarily engaged in creating and developing designs and specifications that optimize the use, value, and appearance of products' (NAICS, Executive Office of the President Office of Management and Budget 2002). However, serious limitations come with the use of NAICS codes for industry identification. For example, firms that specialize in contract R&D may also offer design services. Similarly, large firms that mainly sell management consulting services may also have design divisions. Therefore, from this perspective, the task of identifying the design industry is far from straightforward.

A total of 759 companies with either NAICS code was listed in Reference USA database in 2005. This number is smaller than the Census Bureau's 2005 estimate of 1,600 companies because firms are under no obligation to register with Reference USA. All 759 companies were contacted by phone to encourage participation in the survey. These initial contacts screened out a total of 74 companies that were wrongly coded by Reference USA (i.e. most of these companies were graphic and/or interior design units). Of the remaining 685 companies in the database, 389 agreed to participate in the study. Thus, three-hundred and eighty-nine questionnaires were mailed to the participants. A total of 85 companies completed the survey, resulting in a 21% response rate.

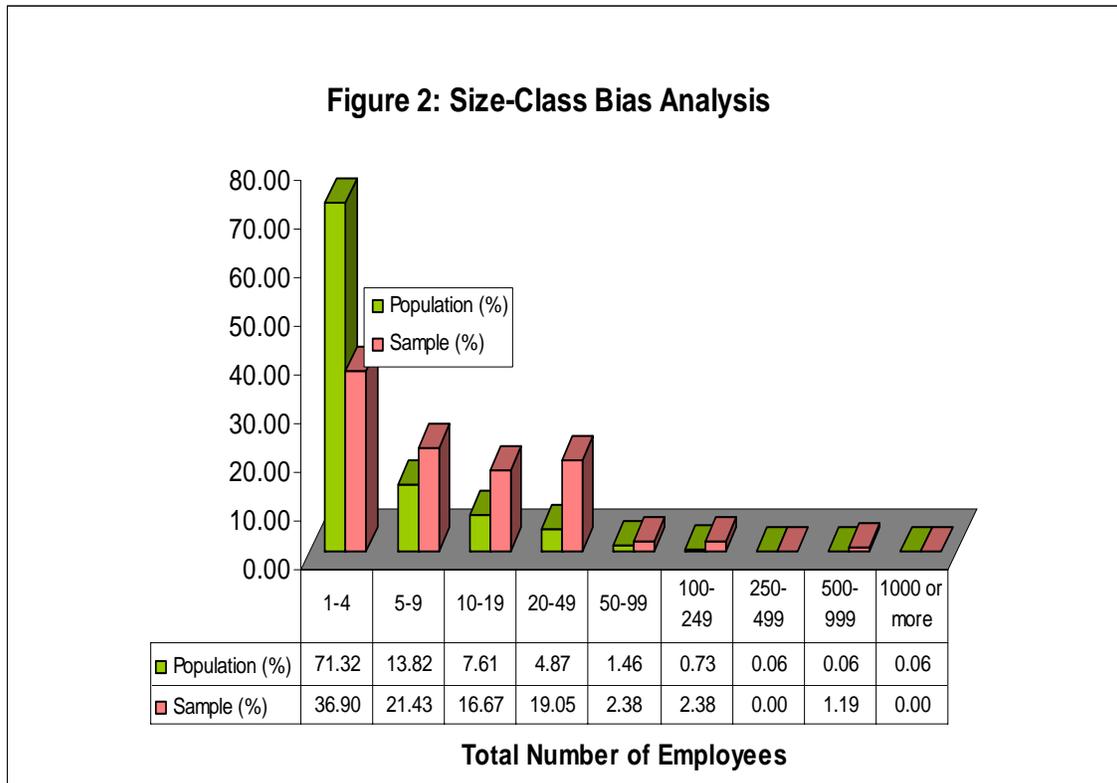
The survey instrument was designed to obtain basic data on firm-level attributes (e.g. employment size, age, occupational structure); the nature of their relationships with customers; competitive and market attributes (e.g. sectors served, sales territories, export activity); recent growth performance in terms of employment, sales, and profitability; and a variety of innovation measures including investment in new technology and worker training.

The response rate of 21% was quite disappointing even though response rates of 20% or lower are prevalent in surveys of small companies (Bartholomew and Smith 2006; Dennis 2003). It was not possible to probe for non-response bias because the sampling frame contained insufficient data to compare respondents with non-respondents. The alternative technique was to compare early versus late respondents (the assumption is that the latter more closely resemble non-respondents). Unfortunately, this approach was not possible either, as around 90% of the surveys were received within ten days of the initial mailing. One source of bias in the sample

concerns surveyed firms' locations. The sample appeared to over-represent firms in Rustbelt locations, and under-represent firms in the South and West (see Figure 1). On the other hand, the sample is representative of the broader population in terms of the size distribution of firms as reported by the US Census Bureau in 2005 (see Figure 2).



Source: Figure created by the author in Vanchan (2006) with data from the survey and the U.S. Census Bureau of the industrial design establishments in 2002



Source: Figure created by the author in Vanchan (2006) with data from the survey and the U.S. Census Bureau of the industrial design employment in 2002

SURVEY RESULTS

Table 1 gives a synopsis of the basic characteristics of the surveyed firms. The youngest firm in the sample was three years old at the time of the survey, whereas the oldest was established 67 years ago (the modal age was around 17 years). Although the average size of employment is 22.5 workers, the typical design company is a single-person unit (mode = 1 employee). This

average reflects a rather abnormal distribution because one firm employs around 600 people. In terms of the employees' skills, the surveyed firms employ, on average, around four professional designers, two engineers, and two specialists in related fields. Moreover, the majority of firms (87.1%) have only one-business location.

Table 1: Basic characteristics of responding firms

	Mean	Median	Mode	Minimum	Maximum
Age (years)	1982.7 ≈ 1983	1986	1989	1939	2003
Size (total number of employees)	22.43 ≈ 22	7	1	1	600
Number of Designers	3.66 ≈ 4	2	1	0	23
Number of Engineers	2.06 ≈ 2	0	0	0	50
Number of other Professionals	2.10 ≈ 2	0	0	0	80
Multi-branch organization	Yes	No			
	11 (12.9%)	74 (87.1%)			

Source: Vanchan (2006)

Table 2 summarizes the types of assistance provided by the surveyed firms. A majority of firms (90.1%) assist their customers in developing new designs or products. Increasing clients’ revenues (83.75%) comes in second, followed by improving clients’ product quality (80.3%), improving clients’ products’ styles and aesthetics (79%), easing clients’ manufacturing performance (77.8%), reducing clients’ product defect rates (72.8%), improving clients’ technological performance (70.4%), conducting research (70.4%), and improving clients’ ergonomics (64.2%). In summary, the data indicate a positive contribution in all categories among the majority of respondents.

Face-to-face linkages and the nature of relationships

The results indicated that firms rated similarly on the importance of modes of communication and delivery of products/services based on 5-point Likert scales (see Table 3). From a communication perspective, face-to-face communication ranks first (72.9%) as the most important mode of communication, followed by e-mail

or internet (65.9%), telephone (51.2%), fax (16.5%), and mail (10%). From a service delivery perspective, a face-to-face method still holds the first position (63%), followed by e-mail or internet (60%), telephone (38%), mail (17.5%), and fax (10.1%) (Table 3). Moreover, a chi-square test revealed no statistically significant variations between the need for face-to-face contact and the technological intensity of client sector (P = 0.774). In other words, a majority of the surveyed firms indicated that face-to-face meetings with clients are critically important across all phases of project development, regardless of the technological intensity of their client sectors. Typically, most design contracts start and finish with face-to-face discussions with clients. The front end of a contract usually begins with face-to-face conversations to establish design parameters, payment conditions, timelines, and other aspects of the business relationship (e.g. the identification of project liaison teams). The rear end of a contract usually requires site visits by the consultant to showcase the nature of the output, which can include anything from helping the client with tooling setup to explaining the technical attributes of the final outputs.

Table 2: The types of assistance provided to client firms

Type of Assistance	Yes	No
Conducting Research	57 (70.4%)	24 (29.6%)
Developing New Designs or Products	73 (90.1%)	8 (9.9%)
Reducing Clients' Product Defect Rates	59 (72.8%)	22 (27.2%)
Easing Clients' Manufacturing Performance	63 (77.8%)	18 (22.2%)
Increasing Clients' Revenues	67 (83.75%)	13 (16.25%)
Improving Clients' Product Quality	65 (80.2%)	16 (19.8%)
Improving Clients' Ergonomics	52 (64.2%)	29 (35.8 %)
Improving Clients' Products' Styles and Aesthetics	64 (79%)	17 (21%)
Improving Clients' Technological Performance	57 (70.4%)	24 (29.6%)

Source: Vanchan (2006)

Table 3: Importance ratings of modes of communication and delivery of products/services

Importance of communication and delivery modes	Zero		Low		Medium		High	
	Comm.	Delivery	Comm.	Delivery	Comm.	Delivery	Comm.	Delivery
Face-to-Face	2 (2.4%)	5 (6.2%)	3 (3.5%)	6 (7.4%)	18 (21.2%)	19 (23.5%)	62 (72.9%)	51 (63%)
Telephone	4 (4.8%)	14 (17.7%)	4 (4.8%)	15 (19%)	33 (39.3%)	20 (25.3%)	43 (51.2%)	30 (38%)
Fax	22 (25.9%)	31 (39.2%)	22 (25.9%)	27 (34.2%)	27 (31.8%)	13 (16.5%)	14 (16.5%)	8 (10.1%)
Mail	31 (38.8%)	29 (36.3%)	28 (35%)	30 (37.5%)	13 (16.3%)	7 (8.8%)	8 (10%)	14 (17.5%)
E-Mail/Internet	5 (6.1%)	6 (7.5%)	9 (11%)	8 (10%)	14 (17.1%)	18 (22.5%)	54 (65.9%)	48 (60%)
Other	0 (0%)	0 (0%)	0 (0%)	1 (10%)	3 (75%)	0 (0%)	1 (25%)	9 (90%)

Source: Vanchan (2006)

Most firms indicated in writing that electronic modes (internet-based) of interaction have not reduced the need for face-to-face interactions, even though such modes have become quite important for exchanging design drafts and large files. Moreover, face-to-face meetings, according to most firms, help to build trust-based relationships with clients. Over half of all the firms' sale revenues over the last five years come from existing customers (see Table 4). Existing customers account for an average of 73.39% of the firms' sales over the last five years (Table 4). This underscores

the importance of existing customers to the firms within the industrial design industry and the fact that customer retention is a top priority. Having an existing relationship with clients was also found to be one of the top five factors that contribute to firms' success (see Vanchan 2006). Eighty percent of the respondents view their existing relationship with their customers as the most successful marketing approach for their businesses. Moreover, seventy-three percent of the respondents consider word-of-mouth as their most successful marketing approach (see Vanchan, 2006).

Table 4: The nature and change of the relationship between responding firms and their customers

% of sales over the last five years	Existing customers	New customers		
Mean	73.39%	26.61%		
Median	80%	20%		
Mode	80%	20%		
Minimum	0%	0%		
Maximum	100%	100%		
Relationship with customers	Not close at all	Medium or somewhat close	Very close	
	1 (1.2%)	24 (28.6%)	59 (70.2%)	
Changes in relationship with customers compared to 3 years ago	Remained unchanged	Have changed but only slightly	Have changed to a significant extent	Have changed completely
	44 (53%)	25 (30.1%)	13 (15.7%)	1 (1.2%)

Source: Vanchan (2006)

An overwhelming majority of the surveyed firms (98.8%) described their relationship with customers as somewhat close or very close (see Table 4). When asked to identify changes compared to three years ago, not much change was found in the firms' relationships with customers as more than half of the surveyed firms (53%) indicated that their relationship with customers has remained

the same or unchanged compared to three years ago. Most importantly, those changes were positive rather than negative. For example, some firms indicated that they were more driven by clients needs and improved technology. Some were calling, visiting clients more often, and spending more time at customers' locations. For changes in the relationships with other businesses, some

firms indicated that they had established a larger vendor base and more networking.

In summary, face-to-face contact was found to be strategically important for all participating firms and did not vary with the technological intensity of client firms. Most firms had a close relationship with their clients and relied more on existing customers than new customers. If there were any changes in their relationship, they were only positive rather than negative changes.

Geographic location and proximity issues

Thirty-one percent of respondents are automotive component or sub-assembly designers, followed by textiles (26.2%), machinery (21.4%), household goods (13.1%), and aerospace designers (8.3%) (see Table 5). Around forty-four percent of the surveyed firms are located in the Midwest, followed by the Northeast (35%), West (11%), and South (9%) (see Figure 1). According to the latest data from the US Census Bureau, 27.53% of all industrial design firms are located in the Western region, followed by 24.54% in the Midwestern region, 24.24% in the Southern region, and 23.69% in the Northeastern region (Figure 1). Therefore, the sample over-represents firms in Rustbelt locations, and under-represents firms in the southern and western regions of the United States. Even so, cross-tabulation results indicated statistically significant differences between customer segments and the regional location of the survey firms (Chi-Square = 0.001). This evidence suggests that the design skills of the responding firms reflect the nature of industrial demand in their home regions. In other words, there is a distinct geography of industrial design firms based on their specialization in that most firms exhibit a client focus that reflects the nature of nearby production. For example, firms that cater to the aerospace sector locate in aircraft

producing states such as Washington and California; whereas those that cater to the machine tool builders are clustered in Ohio and Illinois.

Respondents were asked to identify their client locations and to rate the importance of locating in close proximity to these buyers in order to address the geographical proximity issues between industrial design firms and their customers. A majority of them (55 or 64.8%) indicated that it is either important or very important to locate in close physical proximity to their customers (see Table 5). Again, industrial design firms are highly specialized; thus, their location decision reflects their specialization, customer focus, and the structure of nearby production. A single firm may have customers in multiple locations ranging from local to international. Customers could locate within a firm's local area and region, across the country, or outside of the country (across the world). A local area is an area within 30 miles or 50 kilometers radius of each firm's main business location. This metric is used in conformity with a standard metric that was used in the European Union's project in studying design and innovation a few years ago (Howells and Tether 2004). A region is defined by the Census Bureau's regional divisions. Each primary customer location is determined by the percentage of sales from which that location generates compared to other locations. For instance, firms having primary local and regional markets are those that have the highest percentage of sales coming from customers located within the same metropolitan region; firms having national markets are those that have the highest percentage of sales coming from customers across the country; and firms having global markets are those that have the highest percentage of sales coming from foreign customers. Table 5 summarizes the main customer locations (current, five years ago, and next five years) corresponding to all three location categories described above, the

importance ratings of locating in close physical proximity to client firms, and the

relationship between the customers' locations and growth.

Table 5: Main client sectors, main customers' locations, characteristics, and relationship with growth

Main client sector served	Automotive	Aerospace	Machinery	Household goods	Textiles /Apparel	
Current	25 (31%)	7 (8.3%)	18 (21.4%)	11 (13.1%)	22 (26.2%)	
Main customer's location	Local and Regional		National		Global	
Current	55 (64.7%)		26 (30.6%)		4 (4.7%)	
Five years ago	48 (64%)		23 (30.7%)		4 (5.3%)	
Next 5 years	41 (61.2%)		23 (34.3%)		3 (4.5%)	
Importance of locating in close physical proximity to customers	Zero		Low		Medium	High
	14 (16.5%)		16 (18.8%)		36 (42.4%)	19 (22.4%)
Growth			Local/Regional	Non-Local	P Value	
Employment	Zero		56.5%		20.7%	.004*
	Negative		26.1%		31%	
	Positive		17.4%		48.3%	
Sales	Zero		47.7%		28.6%	.139
	Negative		27.3%		25%	
	Positive		25%		46.4%	
Profits	Zero		31.8%		25.9%	.276
	Negative		38.6%		25.9%	
	Positive		29.5%		48.1%	
Exports	Zero		47.8%		25%	.354
	Negative		8.7%		12.5%	
	Positive		43.5%		62.5%	

*= Statistical significance (P<0.05)

Source: Vanchan (2006)

From a sales perspective, 55 (64.7%) identified their current customers to be mainly located within their local and regional areas; 26 (30.6%) to be located across the country; and four (4.7%) to be located across the world (see Table 5). In other words, the majority of firms are local/regional in focus, followed by nationally and globally oriented firms. The distribution of sales generating from all customers' locations has not changed over the last five years, and is expected to remain unchanged in the next five years. Over half of all respondents (64.8%) indicated that locating in close physical proximity to their customers is an important factor. Around nineteen percent (18.8%) of the respondents considered this as of low importance, while 16.5% considered this to be unimportant. These data indicate no change in the locational patterns of survey firms' main customers over the last five years and in the next five years.

A cross-tabulation analysis was conducted in order to explore the relationship between firm-level growth and the existence of non-local markets. Two main customers' markets (i.e., local/regional market and non-local market) were constructed based on their corresponding sales. The local/regional market was defined based on the percentage of sales generated from local and regional areas (i.e. > 50% of sales come from local and regional customers). On the other hand, the non-local market was defined as having more than half of sales generated outside of the local and regional areas (> 50% from national and global customers).

Firms serving non-local customers experienced more growth in all areas: employment, sales, profits, and exports (see Table 5). For example, 62.5% of firms serving non-local customers experienced positive growth in their exports over the last five years, whereas only 43.5% of firms serving

local or regional customers experienced growth in their exports. Similarly, around forty-eight percent of firms serving non-local markets experienced positive growth in their profits over the last five years, compared to 29.5% of those serving local markets. Only twenty-five percent of firms serving local markets/customers experienced growth in their sales over the last five years, while almost half of firms serving non-local markets/customers experienced sale growth. Around eighty-three percent of firms serving local customers experienced no growth and a deficit in their employment over the last five years, compared to 51.7% among those serving non-local customers. In summary, the rates of company growth have been fastest for industrial design firms that have been developing non-local markets.

SUMMARY AND CONCLUSIONS

Increasing employment of industrial design services to assist core product development, manufacturing, and to some extent product marketing, highlights the significance of the industrial design services and intimacy of the relationship between the industrial design firms and their clients. It is apparent that the types of assistance provided by the industrial design firms are characterized by high levels of scientific and/or artistic intensity (Windrum and Tomlison 1999, Miles 2000, Muller and Zenker 2001, Chiesa et al. 2004), and are known to support the creative needs of users (e.g. Rothwell 1977, MacPherson 1997b, Gemser and Leenders 2001, Bryson et al. 2005). As a result, firms in the industrial design sector provide knowledge-based inputs that spur innovation, which is increasingly vital to the survival and success of modern industrial firms, including major corporations such as Boeing, Caterpillar, General Motors, and Ford (Reina and Tulacz 2001, Hoecht and Trott 2006).

The survey results suggest that the industrial design business is mainly built upon repeat contracts and an existing customer base. This finding supports Vinodrai (2006) on the importance of reputation-building, shared career paths, and repeated collaborations in the design business. With the sensitive nature of exchanged services involving a transfer of codified and tacit knowledge, close and trust-based relationships have been viewed as important factors for long-term relationship building as well as strategic imperatives for the business survival of both design firms and their clients. The intimacy of the relationship in this paper, however, is voiced from a vendor perspective (i.e. the industrial design firms, not the manufacturing firms). Therefore, future studies are needed to shed more light on this interwoven relationship from the client perspective.

With rapidly growing modern modes of communication such as e-mail and the world-wide-web, the results indicated that face-to-face communication is still of strategic and operational necessity to the design businesses; from generating the first impression and hammering out plans, to demonstrating the nature of the output and assisting clients with all relevant issues. In other words, while acknowledging the rising use and popularity of electronic modes of communication across many different horizons, the findings suggest that a conventional form of communication (i.e. face-to-face interaction) is not expected to become obsolete in the foreseeable future.

A concentration of design firms' locations based on their service types is evident as regional specializations were found among the surveyed firms. However, the results indicated that while locating in close physical proximity to customers is important, the most successful firms were those that serve non-local markets. Furthermore, firms that export and operate

with foreign customers tend to exhibit faster growth rates than firms that cater to the domestic market alone. By expanding their target markets, firms are able to attract more customers. As globalization continues, it is crucial for firms in the design sector to deviate from their local-market focus by searching for additional market opportunities if long-term growth is their goal.

In summary, face-to-face communication between industrial design firms and their clients is necessary for relationship-building and long-term success. Trust-based relationships and market diversification are also the critical determinants of their success. Detailed qualitative work is needed in future research, including case studies at the firm-level with regard to the relationship-building and related processes that allow for the development of long-term partnerships between industrial design firms and their clients. As discussed earlier in this paper, outsourcing of design services has been criticized as risky because both tacit and codified knowledge must be transferred to the outside supplier which might give potential competitors access to this knowledge. The risks, however, appear to be neutralized or reduced by the development of trust-based relationships between industrial design firms and clients. These relationships typically breed repeat business. But how are these relationships built in the first instance? Do they start with low-risk or simple projects, and then move to more sophisticated or higher-risk projects? How are new clients found? How have relationships between design firms and their clients evolved over time? The author is currently pursuing follow-up case studies in order to shed light on these questions. For example, early results suggest that very small firms are able to offer a comprehensive array of product development services because they network collaboratively with other design companies.

On a final note, this paper helps offer key results to shed light on a sector that has been overlooked and little studied, especially among economic geographers in the United States. Although my results are still preliminary and a more qualitative study of the industrial design firms and their clients is still needed, the results are important in understanding the contribution of this sector to the overall U.S. economy and its relationship with the U.S. manufacturing sector.

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