



The Role of Industrial Design Within New Product Development Process: Turkey and West Europe

Yeni Ürün Geliştirme Sürecinde Endüstriyel Tasarımın Rolü:
Türkiye ve Batı Avrupa

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ABSTRACT

This article aims to investigate industrial design (ID) effectiveness within Turkish consumer manufacturing Industries (CMI) and considers how Turkish CMI need to become more aware of how ID is managed and utilised as part of new product development (NPD) process in other countries. The approach compares the NPD process for five successful Turkish and Western European CMI, specifically focusing on the purpose, culture, process/performance, and people aspects of business process analysis, and combines qualitative data collection with case studies and a literature review. The research reveals NPD in Turkish CMI was biased to the domestic market, and company organisational structure and management styles were organised from this perspective before 2000. Further, the process of improving product quality to become internationally competitive was exclusively internalised and little influenced by product innovation or customer desirability. This finding established a model for NPD practice that mapped the differences between Turkish and Western Europe CMI, and showed they occurred at an operational level in 2000. The narrowing domestic market profitability volume due to the competitive power created by China in global markets increased many companies' demands in design, in order to increase their exports. The government incentives for R&D and design affected the Turkish CMI development positively; before the year 2000, the exports were shaped by the domestic market oriented product development activities, while thereafter it has been observed that cross-cultural cooperation on NPD activities for target markets and the organisational aspects of design.

Keywords: Business process analysis; global product development; industrial design; internal and external design resources.

ÖZ

Bu makale Türk İmalat Sanayi Firmalarının yeni ürün geliştirme (YÜG) süreci içinde daha etkili endüstri tasarım yapabilmeleri için gelişmiş ülkelerdeki imalat sanayi firmalarının YÜG süreçlerini karşılaştırmalı olarak incelemeyi amaçlamaktadır. Araştırma; literatür taraması ve vaka çalışmalarıyla nitel veri toplayarak, bir Türk ve dört Batı Avrupa olmak üzere beş başarılı imalat sanayi firmasının YÜG faaliyet süreçlerini 'amaç', 'kültür', 'süreç/performans' ve 'insan' unsurlarına odaklanarak analiz etmektedir. Bu araştırmada 2000 öncesi Türk imalat sanayi firmasının YÜG sürecinde firma organizasyonel yapı ve yönetim biçimlerinin iç pazar odaklı organize olduğu, YÜG süreçlerinin içsel ve kapalı süreçler çerçevesinde geliştiği, kültürel bağlamında yenilikçilik ve tüketici arzusu gibi dışsal sorunlardan çok az etkilendiğini tespit edilmiştir. 2000 yılında elde edilmiş bu bulgular, YÜG pratiğinde, Türkiye ve Batı Avrupa imalat sanayi firmaları arasındaki farklılıkları operasyonel düzeyde haritalandıran bir model ortaya koymuştur. Son 10 yıldır ise Çin'in küresel pazarlarda yarattığı rekabet gücü nedeni ile daralan iç pazar karlılık hacmi birçok Türk firmasının ihracata yönelebilmek için tasarıma olan talebini artırmıştır. Kamu tarafından Ar-Ge ve tasarıma ilişkin destekler Türk İmalat Sanayi Firmalarının gelişiminde pozitif etki yaratmış, 2000 yılı öncesinde daha çok iç pazar odaklı ürün geliştirme faaliyetleri ihracata yön verirken günümüzde hedef pazarlar için YÜG faaliyetlerinde ve tasarımın organizasyonel yönünde kültürler arası işbirliklerinin arttığı gözlemlenmiştir.

Anahtar sözcükler: Faaliyet süreç analizi; küresel ürün geliştirme; endüstriyel tasarım; tasarım için iç ve dış kaynak.

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Introduction

The new product development (NPD) process plays an important role regarding global economic competition among countries, and competition among product manufacturers operating internationally is fierce. Companies located in more established industrialised countries use the latest technology to maintain their trading position in highly fragmented international markets, and this has sped up the product development process. NPD can be defined as a “strategic” activity that contributes positively to business performance.¹ In the industrialised market economies of the West and Far East, the link between properly coordinated company-level consumer NPD activity and the performance of companies and countries in international markets has been well explored.² Since the 1980s, several studies have examined how NPD affects the international competitiveness of countries.³ In most of these studies, the role of industrial design (ID) within the NPD process has been defined as a strategic activity that transforms a set of product requirements into a configuration of materials, elements, and components that constitute an artefact. Product design can help improve the competitiveness of products, firms, and national economies.⁴ Design also acts as a mediator, allowing people to interact with one another to make sense of an increasingly complex world. Ultimately, design blends production with consumption.⁵ ID contributes to NPD by enhancing customer interface with the product, including ease of use, capabilities, and appearance.⁶

This article focuses on consumer products manufacturing to increase NPD effectiveness in Turkish Consumer Manufacturing Industries (CMIs). The imperative of designing for export was overlooked in Turkey due to conservative government economic policies prior to 1980. Over the past 30 years, the Turkish government has promised free market economic policies to create opportunity to explore design development of consumer products, which are sold in a cross cultural marketing environment; however, technological development capabilities and research and development (R&D) expenditures in Turkey were found to be relatively low. It seems national technological development capabilities do not “push” product innovation and create product champions in global markets. Consumer trends and buying power are closely related to income levels. The product development cycle and consumption trends are negatively influenced by the low income level of Turkish consumers and their poor purchasing power, and product trends are influenced by consumer income levels;

as a result, the domestic market does not “pull” innovative product design towards an international perspective. Furthermore, especially after the year 2000, the narrowing domestic market profitability volume due to the competitive power created by China in global markets increased many CMIs’ demands in design, the government incentives for R&D and design affected the CMIs development positively.

This research investigates NPD effectiveness in a prominent Turkish CMI, considers how the Turkish CMI needs to become more aware of how NPD is managed and utilised in other countries and determines how it has developed its own improvement strategies to accommodate the NPD process evolution occurring in international trade markets since 2000. The article is based on two following researches. The first research carried on in 2000 compared NPD processes between the Turkish CMI and four Western European CMIs, which were included because there were many notable, proactive CMIs in Western Europe suitable for studying, such as Philips, Electrolux, and Tefal. The research objectives were determine similarities and differences between Turkish and Western European NPD processes and established a model of NPD practice which mapped the difference that existed in Turkish and Western European CMIs. In 2017 a follow up study was carried out in the same Turkish CMI to determine the current position of the Turkish CMI in the global product development model. The following section considers the role of ID in the NPD process.

Theoretical Framework

The Role of Industrial Designer in NPD

The responsibilities of industrial designers regarding NPD are investigated in two categories: First, designers support the firm and national economic performance regarding competition, and second, designers have a professional role within the NPD process.⁷ Pioneering studies concentrating on the role and importance of design in NPD argue design creates value at a macro-economic level,⁸ and emphasize the investment made by CMIs, which demand growth and the production of highly-demanded products, is a reversible profitable investment.⁹ On the other hand, a series of studies on the role of design in increasing the competitive power of countries emphasized that product design was a strategic tool in developing export potential.¹⁰ A commonality of these studies is that product development and design precedes micro and macro-level achievement.

¹ Chiva and Alegre, 2009, Bruce et al., 1999.
² Er, 1997.
³ Rothwell and Gardiner, 1984; Ughanwa and Baker, 1989; Walsh et al., 1992; Er, 1997.
⁴ Roy and Riedel, 1997; Rothwell and Gardiner, 1984.
⁵ Bryson and Rusten, 2011.
⁶ Hertenstein et al., 2005.

⁷ Walsh et al., 1992.
⁸ Ministère de l'Industrie France, 1995.
⁹ Walsh et al., 1992; Roy et al., 1986; Porter et al., 1991.
¹⁰ Rothwell and Gardiner, 1984; Ughanwa and Baker, 1989; Walsh et al., 1992.

NPD is the process of creating new ideas to develop and market the properties that make the new product privileged, and transforming developed ideas into concurrent product outputs. On the other hand, the design process is based on increasing the value, benefit, image, and manufacturability of a product, and is the best tool to meet user needs and desires, and to create competitive products with distinctive features.¹¹ Good design helps achieve a more successful product result, provides competitive advantage, and promotes firms' achievements.¹² Designers significantly impact consumer preference and reactions regarding the products they develop.

ID increases firms' sales and profits; firms contribute to competitive power and product differentiation with respect to rival brands. Among the variety of products available, new products differentiated by designers orientate consumer product preferences and purchasing decisions, and successfully increase consumer brand recognition and awareness. Designers conduct studies to reduce production costs within product development activities, and support the competitiveness and economic performance of manufacturing firms by increasing firms' market share and incomes.¹³

Design is used in different ways to develop competitiveness, reduce product cost, increase product performance and quality, and differentiate from other products.¹⁴ Previous studies investigated the role of product design in competitiveness based on price and non-price factors including product quality.¹⁵ Industrial designers play an effective role in both types of competition; design is a strategic priority task to develop competitive power of the CMI and support growth goals. Therefore, understanding professional roles of the designer within NPD, and effective management of product development processes, are needed for product success.

NPD requires a certain interdisciplinary organisational structure that includes market research and development, production engineering, and ID. The designer undertakes an integrating role between these two disciplines. The designer needs a business network for successful communication and interaction within the organisation, and a market circle regarding the socio-cultural environment the firm serves. Designer involvement in the interdisciplinary structure nurtures his/her creativity. NPD involves acquiring new information, managing acquired knowledge, and transforming it into product/service outputs. Therefore, effective NPD management is the backbone of product success. Designers are primarily responsible for

developing functional, ergonomic, and aesthetic products to offer users new benefits by promoting the interaction between the product and the user. In addition to aiding product formulation, ID also arranges products' functional and technical features and visual identity/image to provide new product configuration.¹⁶ Designers not only create new ideas, they also undertake the roles of interpreter, coordinator, and facilitator regarding NPD.¹⁷ The ID role of interpreting existing and potential user needs under competitive conditions regarding NPD has gained importance and has transformed from product maker specialist (functional area) to leadership.¹⁸ In dynamic industrial markets, designers successfully pursue their dynamic roles, which evolve within the scope of daily changing needs from a broad perspective. It was emphasized the designer role should be enhanced to support efforts to develop new products.¹⁹

Global NPD Elements

Understanding global forces affecting NPD is important to successfully manage NPD in international markets. To achieve success in today's competitive environment, CMI increasingly must develop new products for international markets; they must leverage and coordinate broad creative capabilities and resources, which often are diffused across geographical and cultural boundaries.²⁰ The successful development of new products and marketing strategies requires being global whilst acting local, and this begins with understanding global consumer behaviour. Organisational proximity to consumer markets is an important determinant of global NPD success; that is why competitive CMIs organise NPD organisational structures to get closer to the marketplace. Global NPD technical and marketing collaboration aims to use global resources by understanding target markets; market driven learning is essential for global NPD.

While these new global and environmental influences have been very important to NPD success, previous research indicates success in global NPD is linked to the CMI's international new product strategy, and having a corporate environment that influences global NPD direction.²¹ Thus, strategy and intangibles characterizing the firm's behavioural environment affect global NPD outcomes. In particular, organisational factors such as firm culture, past experiences, tacit knowledge, traditional practices and approaches, and commitment by senior managers have been shown to play an essential role in NPD outcomes.²²

Therefore, NPD success globally is more likely to be related to NPD business structure and strategy. Business

¹¹ Hertenstein et al., 2005; Goffin and Micheli, 2010. ¹⁴ Roy and Riedel, 1997. ¹⁵ Rothwell and Gardiner, 1984; Walsh et al., 1992. ¹² Goffin and Micheli, 2010. ¹³ Bryson and Rusten, 2011.

¹⁶ Crawford and Di Benedetto, 2008. ¹⁷ Turner, 2003. ¹⁸ Perks et al., 2005. ¹⁹ Turner, 2003. ²⁰ Brentani et al., 2010. ²¹ Brentani et al., 2010. ²² Brentani et al., 2010.

strategy determines how objectives can be realised by the organisation, and defines where a company is currently, where it wants to be, and how it will get there. Due to the changing geographic scope of industry, most companies are now expanding beyond national boundaries and this is fundamentally changing the strategic posture of companies.²³ Management thus needs to interpret its business environment on a global scale where new opportunities and threats may exist. In this sense, there is a positive relation between consistent cooperative strategy and NPD organisational structure and management style. The formulation of coherent global corporate strategy is a crucial requirement for NPD success, and requires cross functional and cross cultural integration.

NPD success studies have consistently shown cross functional integration is a recurrent feature in companies producing a stream of new products. Effective cross functional collaboration brings together marketing, R&D, ID, and other functional units in the NPD process, and facilitates learning and concurrent problem solving ability.²⁴ It not only increases information sharing and transfer,²⁵ but also enhances a project team's effort to gather and disseminate information, which in turn affects the proficiency of NPD activities.²⁶ Marketing, technical, and managerial synergies are all influential factors contributing to NPD success.²⁷

Global NPD is also associated with working cross culturally; the function of a collaboration environment (CE) is to narrow geographical distance between end users and the manufacturing process. Multifunctional teams, concurrency of product/process development, integration tools, information technologies, and process coordination are among the elements that enable CE to improve performance.²⁸ Web-based and agent-based collaborative systems have been the two main categories of collaborative CAD systems to support geographically dispersed users with collaborative design tasks in shared environments. In-house or external design consultancies are part of cross cultural operational strategy to acquire knowledge from global markets. Operating in international markets triggers new solutions and enhances innovation capabilities of CMI's.²⁹ Cross cultural collaboration in NPD enables CMI's to appropriate benefits of innovations more advantageously by learning across markets. The benefit of operating by cross cultural collaboration is the opportunity to transfer learning and innovations across markets.³⁰ According to existing literature, organisational factors serve to assist cooperative, supportive working relationships. For example,

integrating work cross culturally with overseas external design consultancies, component suppliers, and retailer chains promotes collaboration and contributes to successful global NPD across cultures. An integrated, exchangeable, shareable, and distributed information environment is addressed by virtual product development within the NPD organisation structure.³¹

This review reveals that there are important similarities between product success and successful global NPD; new product success is likely to be positively related to core factors such as marketing resources and skills, which embrace marketing research and distribution, and technical resources and skills, which include engineering, production, and management factors. These factors were found to be influential facilitators in previous NPD research.³² The research study that this article is based upon supports notions that these factors are important characteristics of global NPD, and that they act as part of a conceptual framework that provides useful perspective for summarising the determinants of successful global NPD. Based on these theoretical considerations, the aforementioned study has identified several factors that contribute to global NPD, which are grouped as follows: business structure and strategy, technical resources and skills, and marketing resources and skills (see Figure 1: Diagrammatic representation of global NPD elements and case study focus areas). These aforementioned factors have been previously identified as central to NPD success, and cover the entire NPD process.

Methodology

This article is mainly based on the findings of a research study carried in 2000 that consisted of five case studies (1 Turkish and 4 Western European).³³ In 2017, a follow up study was made with the same Turkish CMI that was selected in 2000. Although the article focuses on the findings of the early study carried out in 2000, it also reports the findings of the recently done follow up study and discuss those specifically for the Turkish context.

In the first study conducted in 2000, the selection criteria of the case study CMI's were determined as follows: 'market sector of CMI's', 'design leadership', 'geographical location'. In addition to these 'company size' and 'permission and willingness' were added as selection criteria. i) Market sector- Selected CMI's were from the same field of production. All CMI's in this study operated in the major domestic appliances field. These CMI's were commercially successful with a reputation for good product development. ii) Design leadership-The views of successful

²³ Jones, 1997.

²⁴ Sherman et al., 2000.

²⁵ Frishammar and Hörte, 2005.

²⁶ Song & Parry, 1998; Cooper and Kleinshmidt, 1991.

²⁷ Cooper and Kleinshmidt, 1991.

²⁸ Bhuiyan et al., 2006.

²⁹ Barkema and Vermeulen, 1998.

³⁰ Craig and Douglas, 2000.

³¹ Zhao et al., 1999.

³² Calantone et al., 1996; Song and Parry, 1998; Cooper and Kleinshmidt, 1987.

³³ Unsal; 2000.

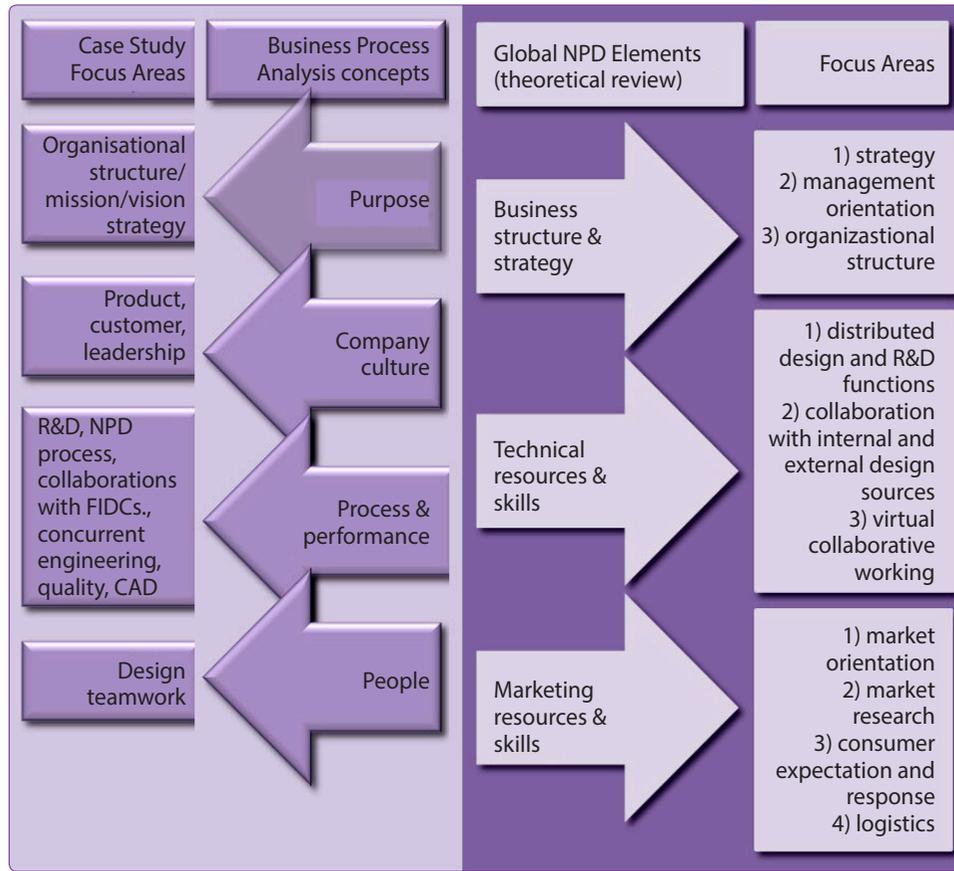


Figure 1. Diagrammatic representation of global NPD elements and case study focus areas.

companies, it was felt, would prove of greater value to the project than those of firms whose record was not so good or had yet to be established. A primary concern was thus to identify companies demonstrating commercial success—whether recent or long standing as well as a reputation for good industrial design. iii) Company size- and Geographical location- It was considered that large size companies would best answer the research objectives concerning NPD in Turkish and Western European CMI. The market orientation of CMI was important as a selection criteria in order to observe perspectives in the global market place with respect to the NPD process. iv) Permission and Willingness- Another influential factors in order to be able to select case study CMI was the willingness of companies to collaborate and allow the researcher to enter the company for research purposes.

The research focused on four issues (purpose, culture, process and performance, and people), which were derived from business process analysis³⁴ to build a picture of CMI's NPD processes, and understand the characteristics of NPD activities within an operational context in 2000 (see Figure 1). Data was gathered through semi-structured interviews with design managers of the selected CMI who

were directly involved in NPD, reviews of documentary sources, and direct observations at the CMI sites; data was analysed using “grounded theory”.³⁵

The case studies were analysed and discussed under the guide of a standard set of open ended questions. The order of the specifically designed interview questions provided an opportunity to identify the diversity of the NPD business process of CMI in Turkey and Western-Europe. These basic investigation concepts were made in the interview design phase (see Figure 1). This facilitated a cross comparative analysis of the Turkish and Western European Case study CMI. These questions were presented using the factors such as business structure and strategy, products, consumers, NPD process—performance, research and development, collaboration with external ID consulting service, concurrent engineering and other similar methods, quality, computer aided design, people and design teamwork, validation of current NPD operational direction and indication of the NPD future direction.

Case study analysis began with the statement of business structure and strategy to understand the basic ‘purpose’ of the CMI. This stage involved analysing the business organisational background, mission statement and

³⁴ Champy, 1995.

³⁵ Strauss and Corbin, 1990.

vision strategy of CMI's. It also involved discussion about a company's new products, and the decision behind the replacement of their products in the market. The market of the products was identified as well as the strategies they were using in order to target and satisfy their consumers. Product and customer related questions were also asked to understand the "company's culture" in NPD. Consumer related questions identified the degree of closeness of CMI's to the market place in the NPD process. The strengths and weakness of NPD global operational capabilities in both Turkish and Western-European CMI's were established by the consumer related questions. The NPD 'process and performance' of CMI's are identified through consideration of R&D, NPD process, collaboration with external design consultancies, the use of concurrent engineering methods, the application of quality systems as well as CAD as a design tool in the design process. People as the human resource in NPD were discussed by identifying how companies organise their staff to work together in project teams and develop new product successfully.

Each CMI's NPD operation was plotted on the map and presented to product design managers to validate the current direction of product development organizations in the market place. Similarly, questions concerning the future direction of NPD organisation were made to design managers to indicate future movement by CMI's in the global market places. The case study analyses were validated by sharing the findings with the product design managers from the respective case study CMI's.

In order to identify the recent developments in the NPD processes of the Turkish CMI a follow up study was conducted in 2017. The follow up study in the Turkish CMI that was also the subject of inquiry in the original study consisted of semi-structured interviews with the design manager and documentary research. The follow up study used the same methodology which was used to examine NPD Business Process of the Turkish CMI in 2000. It particularly looked into four issues purpose, culture, process and performance and people which were derived from business process analysis. In this stage of the study, the recent developments in the ID, market and R&D organisation structures of Turkish CMI's and their cooperation with suppliers were studied. Concerning the improvement of firm's competitiveness capacity, its current position in the global product development model detected in this study is discussed.

Cross Comparison of NPD Process Elements in the Selected Companies with Particular Reference to the Differences between the Western European CMI's and the Turkish CMI in 2000

Case study data received in the major study that this article is based upon indicated major differences between

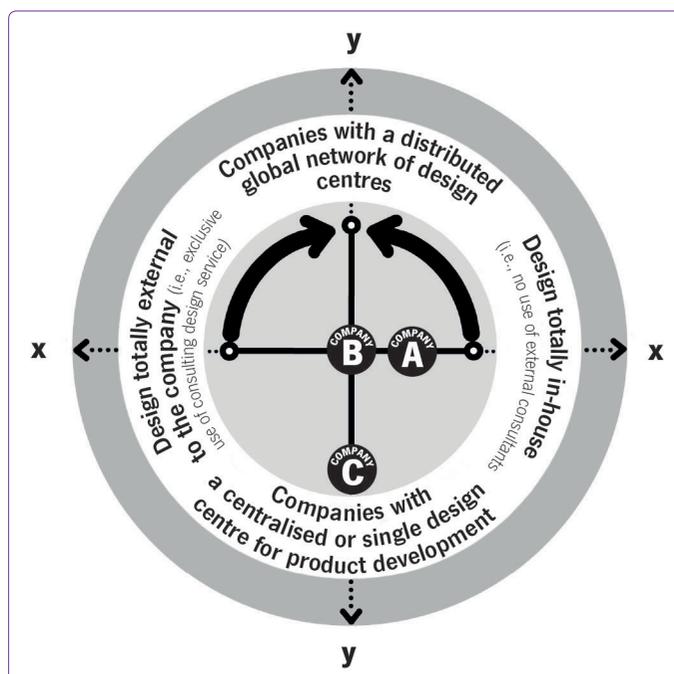


Figure 2. The Spectrum of NPD Activities. Figure 2 describes cross cultural collaboration on the basis of global networking by the distribution of internal and external design centres. The Y-axis represents the geographic distribution of CMI's NPD activities. The X-axis represents the internal and external distribution of product development functions in relation to CMI's. Both axes can be used to develop a global understanding of the different consumer trends and design cultures that are significant influences on the acceptance and success of NPD programmes. Note: Company A is Swedish; Company B is Dutch, and Company C is Turkish.

Western European CMI's and the Turkish CMI,³⁶ illustrated diagrammatically describing variations in the respective CMI's approaches in 2000 (see Figure 2). NPD in Turkish CMI focused on the domestic market. As a result, its organisational structure and management style had been organised from this perspective. Similarly, the process of improving product quality to become increasingly competitive in international markets was exclusively an internalized process, which was not influenced enough by external design issues (e.g. product innovation, identity, and desirability in different cultural contexts). The interpretation of this finding established a model of NPD practice which mapped the differences that existed in Turkish and Western Europe CMI's (see Figure 2), and the differences had been found to occur at the operational level. The model was exemplified below using two CMI's that represent the spectrum of the NPD process activities of four selected Western European CMI's. It describes cross cultural collaboration on the basis of global networking by the distribution of internal and external design centres.

Company A in Figure 2 has an in-house ID function, which is distributed globally and thus acquires design

³⁶ Unsal, 2000.

culture influences from different countries. This model involves the use of several regional in-house design departments in different markets. Here, in-house designers operate across different countries to appreciate product trends from the different markets. This model of organisation needs to incorporate global understanding to obtain cross cultural information about market trends.

Regarding Company B in Figure 2, the ID function includes an external design service influence on NPD. In this

model, freelance design consulting services (FIDCs) are carefully selected to work collaboratively with in-house design teams on strategic products to ensure different design approaches and cultural viewpoints. This model of collaborative organisation is performed cross culturally to obtain fresh product ideas from different markets.

Case study findings revealed Turkish CMI did not have external market influences, such as product innovation, identity, and desirability, in different cultural contexts in

Table 1. Cross Comparison of NPD Elements in Turkey and Western Europe

NPD Process in Turkey	NPD Process in Western Europe
<p>1- Business structure and strategy</p> <ul style="list-style-type: none"> ■ Intra-NPD network and home country organisation * Centralised single in-house design dept. <input type="checkbox"/> Decentralised development departments ■ NPD management in home country ■ Local distribution network ■ Company vision <input type="checkbox"/> Organisational expansion strategy <input type="checkbox"/> Dual brand strategy 	<p>1- Business structure and strategy</p> <ul style="list-style-type: none"> ■ Inter and intra-NPD network and cross cultural organisation * Decentralised in-house design depts. * Collaboration with FIDCs <input type="checkbox"/> Decentralised development departments ■ Worldwide NPD management organisation ■ Worldwide distribution network ■ Cross functional team-based vision <input type="checkbox"/> Organisational expansion strategy <input type="checkbox"/> Multi-brand strategy
<p>2- Technical Resources and Skills</p> <ul style="list-style-type: none"> ■ Centralised single R&D unit ■ No collaborative NPD project with suppliers <input type="checkbox"/> CE practiced within NPD network organisation <input type="checkbox"/> Particular NPD model adopted <input type="checkbox"/> Formal quality systems <input type="checkbox"/> Multi-disciplinary team working in NPD <input type="checkbox"/> Conflicts between different functions ■ Specialist skills in design process to focus on product <input type="checkbox"/> CAD and rapid prototyping hardware and software electronic data distribution systems used for design and production ■ Product oriented approach to assimilate or modify existing product technologies to adapt to manufacturing conditions 	<p>2- Technical Resources and Skills</p> <ul style="list-style-type: none"> ■ Many decentralised R&D units ■ Collaborative NPD project with suppliers <input type="checkbox"/> CE practices within NPD network organisation <input type="checkbox"/> Particular NPD model adopted <input type="checkbox"/> Formal quality systems <input type="checkbox"/> Multi-disciplinary team working in NPD <input type="checkbox"/> Conflicts between different functions ■ Multi-disciplinary skills in design process to focus on social, cultural, and technological possibilities <input type="checkbox"/> CAD and rapid prototyping hardware and software, electronic data distribution systems used for design and production ■ Human-centred and market-led approach for new business opportunities by collaboration with marketing and technical skills
<p>3- Marketing Resources and Skills</p> <ul style="list-style-type: none"> ■ Market research in domestic market ■ Regeneration and upgrading plan ■ Cultural diversification not taken into account in international markets (Turkish customers involved in NPD process) <input type="checkbox"/> Existing product trends monitored annually ■ In-house logistics ■ Communication networks to monitor demand and supply balance in home market ■ Cheap product competitiveness through cheap labour force and production volume (cross-market research for production volume) ■ Long-term product planning capability as a result of domestic market proximity 	<p>3- Marketing Resources and Skills</p> <ul style="list-style-type: none"> ■ Extensive global market research ■ Future NPD plan ■ Cultural diversification considered in NPD <input type="checkbox"/> Existing product trends monitored annually ■ In-house and external logistics ■ Communication network to monitor demand and supply balance in international markets ■ Cheap product and high product quality competitiveness through flexible manufacturing and product design ■ Long-term planning capability as a result of global market proximity

Note The matrix synthesizes similarities and differences in NPD of Turkish and Western European CMIs. Italic typeface indicates established similarities apparent from the Turkish and Western European case studies results.

2000. Conversely, the process of improving product quality was an exclusively internalised process, which was not influenced by external design issues; from this, a model was interpreted. This model has two dimensions that operate on a global basis: the level of internal design service influences and the level of external design service influences. This global operational model was not used by Turkish CMI in 2000 (see Figure 2).

Analysis of the case study interviews, documented sources, and direct observations at the Turkish CMI revealed four important considerations (see Table 1). First, Turkish CMI were characterised as manufacturing oriented companies as the production engineer plays a predominant, active role in the NPD process. Products were developed based on existing product trends. Design and development was based on the assimilation and adaptation of existing technologies, and modification was done to suit local needs.

Second, the NPD organisational structure and management style exhibited ethnocentric/ domestic company characteristics. Turkish CMI used centralised, single in-house ID and R&D centres (i.e., an intra-domestic NPD network organisation), and they did not integrate cross culturally with external overseas resources (e.g., external ID and R&D consultancies, supply industries, etc.). Third, Turkish CMI excluded international consumers and users; they did not take account of cultural and anthropological differences in consumer markets. New products were specified according to domestic market circumstances. Lastly, Turkish CMI exhibited very poor NPD global logistics practices in international markets.

To illustrate the research conclusions, the findings from the cross comparative analyses were contrasted with established global NPD elements derived from previous literature. The results showed generalisations that help explain the relationships that existed between the actual NPD processes of Turkish and Western European CMIs and global NPD elements (see Table 2).

According to this cross comparative analysis, no global NPD elements of business structure and strategy (e.g. business strategy, management orientation, and organisational structure) found in the literature were found in actual NPD practices in Turkish CMI. By contrast, most of these elements were found in the NPD practice of Western European CMIs (see Table2).

The same comparison also shows no global NPD elements of technical resources and skill factors (collaboration with in-house and external sources, distributed design and R&D functions, and virtual collaborative working), as derived in previous literature, were found in the actual NPD practice of Turkish CMI. However, CE and Internet based communication skills in Turkish CMI were found to enable collaborative NPD projects with overseas suppliers (see Table2). Further, it indicates the contrastive analysis results also show the “market orientation” of Turkish and Western European CMIs exhibited similarity: both operate in international markets through their own products and services. Despite established similarities between the findings, Turkish CMI exhibited very poor practice in other marketing resource and skill areas such as market research, consumer product expectation, and product logistics. Th-

Table 2. Contrast of Turkish and Western European Actual NPD Elements with the Proposed Global NPD Elements (Summary of Results)

Global NPD Elements (Core Factors)	Turkey	Western Europe
1) Business Structure and Strategy Factors		
(i) Business Strategy	☐	■
(ii) Management Orientation	☐	■
(iii) Organisational Structure	☐	■
2) Technical Resource and Skills Factors		
(i) Distributed Design and R&D Functions	☐	■
(ii) Collaboration with In-House and External Sources	☐	■
(iii) Virtual Collaborative Working	☐	■
3) Marketing Resource and Skills Factors		
(i) Market Orientation	■	■
(ii) Market Research	☐	■
(iii) Consumer Expectation and Response	☐	■
(iv) Product Logistics	☐	■
■= outstanding approach to practice; (recommended model of practice)	Totals	1
☐= very poor practice; (considerable problems with progress)	Totals	9
		10
		/

ese elements contrasted significantly with the actual NPD practices of Western European CMI's (see Table2).

The Western European CMI's geographically distribute ID functions by collaborating with in-house and/or external satellite organisations. As part of the same research, representative design managers were asked for their expectation for the future direction of ID activity (the direction needed for the CMI's to become more competitive globally) in accordance with global NPD. They indicated collaboration with overseas external design consultancies is the more likely future direction of the case study CMI's from Western Europe and Turkey. Most of the design managers stressed proximity to target markets through an intimate knowledge can be maximized through a distribution of external design consultancies, as they provide access to regional differentiation. Below, how and in which direction Turkish CMI's NPD activities in global markets after the year 2000 have developed will be analysed.

The Recent Developments in the NPD Processes of the Turkish CMI

After the year 2000, in order to improve Turkey's international competitiveness, the awareness on the role of NPD/ID increased both in the public and private sector; it has been observed that the Turkish case study CMI complied with the above described NPD operational model (See Figure 2). It was found that Turkish CMI expanded its organisational and operational NPD capacities by ID, market research, R&D and establishing cross cultural and interdisciplinary cooperation with the supplier industry.

The Turkish CMI employs around 30 -mostly Turkish and some foreign- designers. The in-house design organisation is comprised of specialised studios such as; major home appliances, consumer electronics and small house appliances, experience design interface and graphics design. The corporate design management is conducted by the headquarters in Istanbul. There are local in-house ID offices in China and South Africa. These ID offices function as bridges to the design-related market and cultural effects, and contribute to think and act locally in NPD processes. The Turkish CMI had only two brands in the 2000s, while it has since implemented a multi-brand strategy with its 11 brands. All the design services for these brands are provided by the Istanbul ID centre, through cross-cultural cooperation. These findings show that the design activities of the Turkish CMI has intercultural characteristics, as well as interdisciplinary ones. This situation presents similarities with the Western European CMI's.

The Turkish CMI, after the year 2000, has been in cooperation with overseas FIDCs. The design manager confirms that the Turkish CMI has embraced the external source-driven cooperation, however it has expanded the bound-

aries of the in-house ID organisation in order to bolster its global capacities.

The Turkish CMI has been receiving overseas external training consultancies, in order to improve its in-house design capacity. Regular cooperation has been in place with domestic and overseas design schools, to acquire innovative ideas on experience, interface and product design. Before the year 2000, the Turkish CMI was not concerned by external design issues (such as product innovation, identity, desirability in different cultural settings) in the NPD/design processes, it has since implemented more open and innovative strategies to understand cultural effects in foreign markets.

The Turkish CMI has increased its capacities in market research, in order to understand in which direction the international markets would evolve, and to carry out short, mid- and long-term planning. It has been receiving yearly trend surveys from target markets with the in-house market research and development offices in 36 different countries, therefore acquiring tactical information by learning existing and potential product and lifestyle trends that would help NPD. External sources have been used when required. Consulting companies conducting ethnographic research, international retail chains and in-house distribution channels are the internal and external actors that provide detailed market information for NPD/design processes.

After the year 2000, important developments on the market research network organisation structure of the Turkish CMI have been detected. The Turkish CMI that was developing domestic market-driven products until the early 2000s; has since been taking export market consumer into account in the NPD process. This inference has been confirmed by the implemented international multi-brand strategy, and the increase in number of the internationally-located in-house market research offices.

The CMI has 13 R&D offices; nine in Turkey and others in Taiwan, the UK, the USA and Portugal. These centres conduct activities in software design, new materials, advanced manufacturing techniques and development of innovative major home appliances. Equally, there is an "innovation centre" located in an innovation hub (technopolis). This centre provides innovative product technology development services for outside-the-box products that would create difference in competition. More than 1000 professionals have been employed in all of these R&D centres. Also, small units that conduct 'development activities' supporting product-production processes, located in 18 production facilities all over the world.

The Turkish CMI, has been in cooperation with public, academic and private institutions and innovation suppliers for R&D, apart from its internal resources. It has strengthened its global R&D ecosystem in cooperation with world-

leading universities such as Cambridge, MIT, Oxford, and Imperial College, in order to catch up with new technologies throughout the world, identify talent and develop innovative technologies. According to the WIPO(2015) records, the Turkish CMI ranked 78th among companies with the highest number of patent applications, had more than 2500 patents as of 2016, and allocated 1,52% of its annual turnover to the R&D expenses by increasing its R&D budget by 15% in average each year. While this increase seems to be weak in comparison with the Western European CMIs, it is still noteworthy compared to the pre-2000 period.

The Turkish CMI outsources the production of small home appliances to suppliers. The increase in awareness on the added-value created by the branding and ID in international commerce has triggered the improvement in organisational capacities in in-house design. Domestic and overseas cooperation has been in place with the supplier industry on the small house appliances sector.

The product technology infrastructure has mostly been acquired by NPD processes in cooperation with the supplier industry, or by purchasing the usage rights technology infrastructures of products initially prepared by other producers. In both cases that use supply industry, in order to protect and improve the brand-product identity scheme, the product design is carried out by the central design office.

As China has emerged as an important global actor in supply industry-driven production design processes of small house appliances, the CMI has been in cooperation with ten Chinese suppliers, as have many Western European CMIs. The Turkish CMI had cooperation mostly with domestic actors in the pre-2000 period, while it has since expanded its international supplier network by implementing NPD processes with overseas suppliers. Moreover, it has been found out that the CMI has used external resources in market research, supply industry and innovation suppliers when required; the cross cultural cooperation demand has been in increase since the findings in the year 2000.

Conclusion

Established global NPD elements from the literature search show learning about target markets, customers, and competitors is essential to NPD; market research provides designers with tactical knowledge so they can create unique products, and is thus an organisational competence that fosters distribution of in-house and/or external market research organisations. The Western European CMIs have local country organisations grouped into regions (Pacific Rim, America, and Europe). Within these, they operate on a country-by-country basis and collaborate with international distribution channels, local retailers, subsidiaries, and key suppliers to get close to market influences and provide NPD product logistics. These results showed Turkish

CMI had organisational weakness in their market research and international product logistics in 2000. However Turkish CMI has began to employ market research companies from overseas local markets to involve key global consumer influences in NPD for the last ten years. Furthermore, Turkish CMI started to collaborate with local overseas retailers, subsidiaries, and distribution channels to provide NPD product logistics. Turkish CMI have moved from domestic market oriented NPD activities to cross cultural ones to develop its competitiveness for international markets.

Extension of NPD organisational structure would increase CMIs opportunities as greater engagement in international markets via alternative cultural design thinking and manufacturing expertise. Turkish CMI have developed their organisations beyond Turkey and encourage the employment of the indigenous population of countries in the emerging markets (e.g. East Europe, Africa). However, this employment is related to manufacturing and marketing activities not the R&D and ID. Turkish CMI might benefit from setting up global design studios to manage global brand direction and diversify brand portfolio from a region-centric NPD perspective. In order to do so, collaboration with local in-house and external satellite design studios is essential; this approach is similar to that of Swedish CMI. Further approaches in Turkish CMI might see NPD in terms of aesthetic fashion that creates consumer products with strong visual identities, as well as being price competitive. This approach has been used by CMIs (such as Dutch and French CMIs) that have extended their collaboration with external design consultancies to acquire design culture inputs from various regions. Some Turkish CMI have set up collaborative design centres to orchestrate design policies through satellite based cross cultural design activities, although their collaboration capacities and scales are very low compare to Western CMIs.

Decentralised R&D function is the most expedient solution to encourage new technology and the use of global expertise. Technical resources and skills in handling global NPD elements were not found to be established in actual NPD practice in Turkish CMI in 2000. This was because centralised Turkish R&D activities were too far from the point of global market influence. NPD business process case study findings revealed that R&D investment was relatively low in the Turkish CMI. By contrast, Western European CMIs set much greater budgets for R&D investment. After the year 2000, the Turkish CMI started the R&D cooperation with foreign organisations, and has increased its R&D budget allocation. However, the Turkish CMI has still not yet created its global product champions. Therefore, the Turkish CMI needs supporting R&D activities by establishing cross cultural cooperation with innovation suppliers from technology and science-driven countries, in order to acquire innovative product technologies.

Collaboration with overseas technology suppliers provide the potential advantage of being able to gain access to target markets, lower product costs, and reduced development process costs. The case study results showed that, in Turkey, ready product technological infrastructure was used in the NPD process before 2000. The design process was thus implemented within technology adaptation constraints related to existing product technological infrastructure and Turkish CMI did not develop collaborative NPD projects with supply industry. On the other hand, Turkish CMI started to collaborate with indigenous suppliers to adapt to different national standards in target markets; then partnerships based on R&D collaboration with overseas technology suppliers help to Turkish CMI to overcome regional differentiation and trade barriers since 2000.

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