ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL OF SCIENCE ENGINEERING AND TECHNOLOGY

CONSTRUCTING PRODUCT NARRATIVES THROUGH DESIGN KNOWLEDGE IN NEW PRODUCT DEVELOPMENT PROCESS: STORY OF A NEW CORDLESS STICK VACUUM CLEANER IN ARÇELİK COMPANY

M.Sc. THESIS

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İSTANBUL TEKNİK ÜNİVERSİTESİ ★ FEN BİLİMLERİ ENSTİTÜSÜ

TASARIM BİLGİSİ İLE YENİ ÜRÜN GELİŞTİRME SÜRECİNDE ÜRÜN ANLATILARI OLUŞTURMA: ARÇELİK ŞİRKETİ'NDE YENİ KABLOSUZ ÇUBUK SÜPÜRGE ÜRÜNÜNÜN HİKAYESİ

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ARALIK 2019

Yağmur Gizem AVCI, a M.Sc. student of ITU Graduate School of Science Engineering and Technology student ID 502161906, successfully defended the thesis/dissertation entitled "CONSTRUCTING PRODUCT NARRATIVES THROUGH DESIGN KNOWLEDGE IN NEW PRODUCT DEVELOPMENT PROCESS: STORY OF A NEW CORDLESS STICK VACUUM CLEANER IN ARÇELİK COMPANY", which she prepared after fulfilling the requirements specified in the associated legislations, before the jury whose signatures are below.

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Jury Members :	**Prof. Dr. Şebnem TİMUR** Istanbul Technical University	.....
	Assoc. Prof. Dr. Meltem ŞEN Mimar Sinan Fine Arts University	.....

Date of Submission : 15 November 2019
Date of Defense : 20 December 2019

To my spouse and family,

FOREWORD

I would like to express my gratitude to my advisor Assoc. Prof. Dr. Çiğdem KAYA PAZARBAŞI for her support and guidance that always add value to my study; and for always encouraging me to reveal better outputs through my undergraduate and graduate education at Istanbul Technical University. I would also like to thank my mentors from Arçelik company who are Product Sourcing Department R&D Manager, Derya HAMARAT, and Team Leader, Can ARER for their support through my graduate education; and my colleagues at Arçelik company Small Domestic Appliances team, who have any contribution to my study.

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ABBREVIATIONS

SDA	**:** Small Domestic Appliances
NPD	**:** New Product Development
UX	**:** User Experience
R&D	**:** Research and Development
CI	**:** Consumer Insights
CAD	**:** Computer Aided Drawing
SBC	**:** Self-Brand Connection
TA	**:** Thematic Analysis

SYMBOLS

V	: Volt
L	: Liter
gr	: Gram
kg	: Kilogram
W	: Watt

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CONSTRUCTING PRODUCT NARRATIVES THROUGH DESIGN KNOWLEDGE IN NEW PRODUCT DEVELOPMENT PROCESS: STORY OF A NEW CORDLESS STICK VACUUM CLEANER IN ARÇELİK COMPANY

SUMMARY

In a changing and developing environment of production and consumption, needs, demands, expectations of consumers, and the practice of everyday life of people and consumers have been changing and evolving. Regarding these changes, product development, design, and communication processes have also been transforming to reach and get place in a growing and competitive market. In such context, to comprehend user expectations and creating innovative, functional, competitional products/services and reaching the potential consumer through value-added solutions, it is essential and crucial to integrate user experience research and consumer insights into new product development (NPD) processes. In this study, the main objective and framework has identified as;

- to analyze and enhance approaches, methodologies, and strategies behind and beyond the products/services that presented consumers and markets;
- to integrate the user insight into new product development, design and communication processes with the light of design knowledge,
- to associate user experience studies and basis of communication narratives while involving, examining, and presenting ideal product design, development, and communication processes in the scope of small domestic appliances(SDA) category of Arçelik Company and the scope of the chosen product line 'cordless stick vacuum cleaner'.

Main questions behind the conducted framework of the study, has generated as;

- to understand aims and motivations behind the everyday products' features and to transmit these features for reaching their potential users or consumers; to show how can companies/designers develop value-added products that encounter changing lifestyles and expectations of users and consumers
- to generate a relationship between user experience research, NPD process inputs and outputs and also communication materials in scope of company strategies
- to integrate user-centered design and narrative methodology with user research for stimulating user interest via products/services.

According to these directive questions, the study has consisted of four main sections.

The first section of the study introduces research questions, the aim and scope of the study, the related literature review, and the methodology for the research content and analyzed data. To provide a basis for the study, the literature review section has based on four primary subject matter; user-centered and emotional design, product semantics, user experience (UX), and narrative approaches in product development and marketing processes.

The second section of the study represents the new product development process and related implementations according to the strategies and decisions that consisted of inferences of the literature review section. In terms of reviewed literature, and the scope of company procedure, new product development process has explained with the chronological order to create basis and general knowledge about the project; this section begins with the definition and the history about the chosen product range 'Cordless Stick Vacuum Cleaner' and the explanation about needs and motivations for new product process. Then, according to these needs and motivations, researched literature, recent information and studies, for starting the new product development process, design brief has generated and proposed through the user experience research and consumer insight to define the scope, aims, and objectives of the project. Then the product design evaluation and development process, conducted user experience research for new developed product, and the examining phase of the research in the frame of thematic analysis methodology has been described in detail to create a basis for design stories through consumer insights.

The third section of the study consists of describing brand strategies, determining target persona and story generation phase for the new developed product with the framework of the three brands of Arçelik Company.

According to aim and scope of the study, the last section concludes, evaluates and describes whole development process and outputs which consist design briefing, product design and development and product communication phases in relation with user experience research and consumer insights; to examine strategies and approaches behind and beyond of new product development process, to generate and present value-added, functional, contemporary and memorable products or product features, and for achieving the potential consumers through these products or product features.

TASARIM BİLGİSİ İLE YENİ ÜRÜN GELİŞTİRME SÜRECİNDE ÜRÜN ANLATILARI OLUŞTURMA: ARÇELİK ŞİRKETİ'NDE YENİ KABLOSUZ ÇUBUK SÜPÜRGE ÜRÜNÜNÜN HİKAYESİ

ÖZET

Günümüzde, değişen ve gelişen bir üretim ve tüketim ortamında; tüketici ihtiyaçları, talepleri, beklentileri, insanların ve kullanıcıların yaşam şekilleri, teknolojinin ve ürünlerin değişmesi ve gelişmesi ile paralel olarak değişmektedir. Değişen tüketim ortamında, kullanıcı ihtiyaçlarının ve beklentilerinin değişmesi ile bağlantılı olarak, kullanıcının hayatına değer katacak ürünler ve hizmetler geliştirmek ve rekabetçi pazara katma değerli ürünler sunabilmek için yeni ürün geliştirme, ürün tasarım ve ürün-kullanıcı iletişimi süreçleri de eş zamanlı olarak evrilmektedir. Bu bağlamda, kullanıcıların gündelik hayatında büyük bir yere ve öneme sahip olan küçük ev aletleri pazarında rekabet edebilecek ve hatta lider olabilecek, inovatif, fonksiyonel ürünler ve hizmetler yaratmak, katma değerli çözümler ile potansiyel ve marka stratejisine uygun olarak hedeflenen tüketiciye ulaşmak için kullanıcıların gerçek ihtiyaç ve beklentisini kavramak, etkili kullanıcı deneyimi araştırmalarını ve tüketici içgörülerini yeni ürün geliştirme süreçlerinin çeşitli katmanlarına entegre etmek gün geçtikçe daha önemli hale gelmektedir. Geliştirilen ürünlerin pazarda rekabet edebilecek inovatif, fonksiyonel ve katma değerli özelliklere sahip olmasının ötesinde, bu ürün ve ürün özelliklerinin kullanıcıya nasıl ve hangi bağlamda sunulduğu veya sunulması gerektiği ve ulaştırılması gerektiği de ürünlerin sahip olduğu temel ve ayırt edici özellikleri kadar önem taşımaktadır. Bu durum göz önünde bulundurularak, bu çalışmadaki temel amaç, Arçelik A.Ş. Küçük Ev Aletleri bünyesinde, bu kaygılar göz önünde bulundurularak geliştirilen bir ürün örneği üzerinden;

- tüketicilerin kullanımına ve pazara sunulan ürünlerin, ortaya çıkma motivasyonları, geliştirme süreci ve geliştirme sürecinin çıktılarının kullanıcı ile buluştuğu süreçlerdeki yaklaşım, metodoloji ve stratejileri incelemek
- kullanıcıların gündelik hayatlarındaki ürünlere yönelik yaklaşım, ihtiyaç ve taleplerini, kullanıcı deneyimi ve içgörüsü çalışmaları gerçekleştirerek, yeni ürün geliştirme, ürün tasarımı ve iletişim süreçlerine entegre etmek,
- gerçekleştirilen ve sürece dahil edilen kullanıcı deneyimi çalışmaları ile ideal ürün tasarımı, geliştirme ve iletişim süreçlerinin temelini oluşturan ürün/pazarlama anlatılarının arasındaki etkileşim ve ilişkiyi analiz etmektir.

Bu çalışmanın çerçevesini oluşturan temel ve alt araştırma soruları;

- tüketicilerin hayatında önemli bir yere ve öneme sahip olan küçük ev aletlerinin arka planında bulunan amaçları ve motivasyonları anlamak,
- bu amaç ve motivasyonlar doğrultusunda;şirketlerin veya tasarımcıların, tüketicilerin değişen yaşam şekilleri, ihtiyaç ve beklentilerine yönelik, bu tüketicilerin hayatlarına değer katacak ürünler geliştirmek için, kullanıcı içgörüsü elde etmek ve ürün geliştirme süreci boyunca kullanıcı deneyimi çalışmaları gerçekleştirmenin ve çıktılarının yeni ürün geliştirme, tasarım ve iletişim süreçlerine dahil edilmesinin etkisini gözlemlemek

- geliştirilen ürün veya ürün özelliklerinin hangi yöntemler ile ve hangi bağlamda potansiyel ve hedeflenen kullanıcı ve tüketicilere iletişim kurmak amacıyla sunulması gerektiği gibi ana nosyonlar çerçevesinde oluşturulmuştur.

Bu amaç ve kapsam doğrultusunda, temel ve alt araştırma sorularını irdeleyebilmek için geliştirilen çalışma dört ana bölümden oluşmaktadır.

Çalışmanın ilk bölümünde araştırma soruları, çalışmanın amacı, kapsamı ve içeriği, araştırma ve çalışma sürecinin çerçevesi, ilgili literatür taraması, araştırma kapsamı ve içeriği, çalışma kapsamında gerçekleştirilecek analizler için kullanılan metodoloji yer almaktadır. Çalışmaya uygun bir temel oluşturmak için literatür taraması dört ana konu başlığı üzerine kurgulanmıştır. Bu konu başlıkları; yeni ürün geliştirme sürecinde kullanıcı merkezli ve duygusal tasarım yaklaşımları, ürün anlambilimi, kullanıcı deneyimi ve ürün geliştirme ve pazarlama süreçlerinde anlatı yaklaşımları olarak literatür taraması bölümünde yer almaktadır.

Çalışmanın ikinci bölümü, örneklem olarak seçilen ürün kategorisinin tanımını ve tarihçesini, yeni ürün geliştirme süreci öncesinde gerçekleştirilen çalışmaları, yeni ürün geliştirme motivasyonlarını, ilişkili motivasyonlar ve literatür taraması bölümü çıkarımlarından oluşan stratejilere/kararlara bağlı olarak temellendirilen ve kurgulanan yeni ürün geliştirme sürecini içermektedir. Seçilen ürün tanımı, tarihçesi ve yeni ürün geliştirme motivasyonları aktarıldıktan sonra; gerçekleştiren literatür araştırması ve mevcut şirket işleyişinin entegrasyonu çerçevesinde, yeni ürün geliştirme süreci temel basamakları tanımlanarak, kronolojik sıra ile detaylandırılmıştır. Bu kapsamda sırası ile, gerçekleştirilen kullanıcı deneyimi ve içgörü araştırmalarının analizi, rakip firma ve ürün araştırması, şirket bünyesinde bulunan öncül ürün değerlendirmesi doğrultusunda, yeni geliştirilecek ürünün ilgili ekipler tarafından teknik altyapı ve fiziksel özelliklerinin tarifi ve tanımı ile projenin kapsam, amaç ve hedefini aktaran 'tasarım tarif formu (design brief)' oluşturulmuştur. Tasarım tarifi üzerinden oluşturulan ürün tasarımı, değerlendirme ve geliştirme süreçleri, yeni geliştirilen ürün hakkında kullanıcıların fikir, yaklaşım ve ilişkili ihtiyaçlarını anlamak, bu içgörüler ile ürünü geliştirmek ve tasarım anlatılarına girdi oluşturmak amacıyla ürün fonksiyonel prototipi üzerinden kurgulanan ve gerçekleştirilen kullanıcı deneyimi araştırması, araştırmanın tematik analiz yöntemi çerçevesinde incelemesi ve analiz raporu detayları ile aktarılmıştır.

Çalışmanın üçüncü bölümü, Arçelik A.Ş bünyesinde bulunan, yeni ürün geliştirme sürecinin çıktısını farklı motivasyonlar ve stratejiler ile hedef kullanıcı kitlesi, hedef pazar ve ülkelere sunan Arçelik, Beko ve Grundig markaları üzerinden; her marka için ayrı olarak marka tanımı ve stratejileri, hedef ve potansiyel kullanıcı kitlesi, gerçekleştirilen ve analiz edilen kullanıcı deneyimi araştırmalarına göre tasarım anlatıları oluşturulmuştur. İdeal bir yeni ürün geliştirme çalışmasının çıktısı olarak, geliştirilen ürünün farklı kullanıcı kitleleri ve ülkelere, kullanıcı içgörülerini temel alarak potansiyel kullanıcıya etkili bir şekilde ulaşması için anlamlı içerik ve bağlamda aynı ürün üzerinden üç farklı ürün hikayesi önerilmiştir.

Araştırmanın sonuç ve değerlendirme bölümünde ise, çalışmanın amaç, kapsam, yöntem ve hedefleri gözden geçirilmiş; kullanıcı deneyimi ve içgörü araştırmalarının yeni ürün geliştirme süreçlerine farklı aşamalarındaki entegrasyonunun tasarım tarifi, yeni ürün geliştirme, tasarım ve pazarlama materyallerini iyileştirme yöntem önerisi olarak sunulması irdelenmiştir. Çalışmanın temel araştırma sorusu çerçevesinde, kullanıcıların değişen ve gelişen ihtiyaç, talep, beklenti ve hayatlarına yönelik çağdaş, inovatif, katma değerli ürünler veya özellikler geliştirmek; geliştirilen bu ürünleri veya

özellikleri potansiyel tüketicilere etkili tasarım, bağlam ve stratejilerle sunmak için oluşturulan yeni ürün geliştirme sürecinin arkasındaki ve ötesindeki stratejileri ve yaklaşımları, ürün tasarım ve geliştirme süreçleri, kullanıcı araştırmaları ve tüketici içgörüleri analizleri ile ürün anlatısı oluşturma süreçleri ve çıktıları değerlendirilmiş, bu çalışmasının devam niteliğinde gerçekleştirilebilecek çalışmalar için öngörüler oluşturulmuştur.

1. INTRODUCTION

In the present world, through the changes of material, production, and information technology, and as a result of these technological changes, the practice of people life has changed and evolved. In parallel with these evolutions, the expectation of users has repeatedly been changing through the eventual effect of communication and marketing strategies and materials, trends, and movements. In parallel with these expectations, traditional product development, design, and marketing processes also changed direction because the digital revolution has been turned almost every object into surfaces, and these objects which consumers interact are becoming generally immaterial and turning into black boxes (Bolz, 2000) [1]. For companies that produce and compete in these contexts, integrating innovative features and solutions into their existing or new products and services while observing user-oriented trends and expectations are crucial processes to touch user life and also to get a place in the competitive market. As a consequence of all these changes and evolutions, new product development and marketing strategies have also changed to present value-added products and services and encounter changing demands and current expectations of consumers and the market. According to Demirbilek and Sener, there have been different approaches and features that consumers expect to see in their potential objects or services; usability, durability, functionality, appearance and accessibility of object considered as necessary and essential attributes in consumer point of view; but through changing demands, consumer expect more than basic features out of their potential household (2001) [2]. Contemporary trends are naturally manipulating objects that affect and inspire users, enrich user's lives, creating excitement, or stimulating dreams into consumer minds (Jensen, 1999) [3]. For realizing the purpose of reaching the potential user with product/service and integrating innovations to products, NPD and marketing processes must be enhanced or re-constructed according to product context and concept. For enhancing the NPD process, companies/organizations need to consist, multi-disciplinary teams because NPD should consist of combination and integration of consumer's needs and demands, form and feature, innovation, durability, reliability, marketability to produce useful

and user-centered products. The design has the power and knowledge to integrate ergonomics, technology, innovation, and product concepts and stories. Designers or creators of product or services that will reach users must mainly involve in all creative activities within NPD in order to behave as mediators and consolidators in the field of development, innovation, and communication (Woodcock et al., 2000) [4]. For creating user-centered, functional, innovative and memorable products, it is important to know clearly what potential users demand through user research and consumer insight studies, and to process these knowledge into product feature, create value-added concepts and conveying these features to the potential user while using suitable product and marketing material language.

1.1 Aim and Scope of the Thesis

This research aims to analyze and examine thoughts, methods, and strategies; behind and beyond the products throughout new product development and marketing process; and to associate relationship between user experience testing, consumer insights and basis of marketing narratives in the scope of selected example product which is the cordless vacuum cleaner in Arçelik company. This research developed within the Arçelik company in the scope of the 'University-Industry Collaboration Program' Agreement, which can be seen the first page of the agreement in Appendix A, to generate practice-based thesis study. In this context and scope, some central aspects and questions handled to understand thoughts and strategies; the main research question and related sub-questions of the study are identified respectively as:

- What are the aims and motivations behind developing more innovative everyday products via design and marketing means?
- How can companies and designers develop innovative products that encounter changing lifestyles and changing expectations of users/consumers?
- Is it possible to create an intended link between user experience testing and marketing materials in the scope of particular example of the study?
- What is the role of marketing narratives while designing and promoting products/systems, and its relationship with user experience?

- How can companies/designers stimulate user interest and ambition via integration and combination of consumer insights into NPD, design, and marketing processes?
- What is the role and effect of storytelling, anchoring, and objectification while designing and marketing products?
- What is the role of user-centered and emotional design in marketing and consumption?

1.1.1 Structure of the study

This study consists of four main sections as follows;

- The first section introduces the subject, research questions, aim and scope of the study and the related literature review with the subject matter. The literature review based on four main fields, which are user-centered and emotional design, product semantics, user experience (UX), and narrative approaches in product development and communication processes.
- The second section explains New Product Development and conducted User Experience research processes in the scope of a chosen product, which is a cordless stick vacuum cleaner.
- The third section consists of examining strategy through the result of conducted UX research and narrative generation phase for a new developed product.
- The last section concludes and evaluates the whole research process and outputs of the study.

The detailed structure and the general pattern of the study are shown in Figure 1.1 to clarify the effect and the pattern between reviewed literature, methodology, and research process.

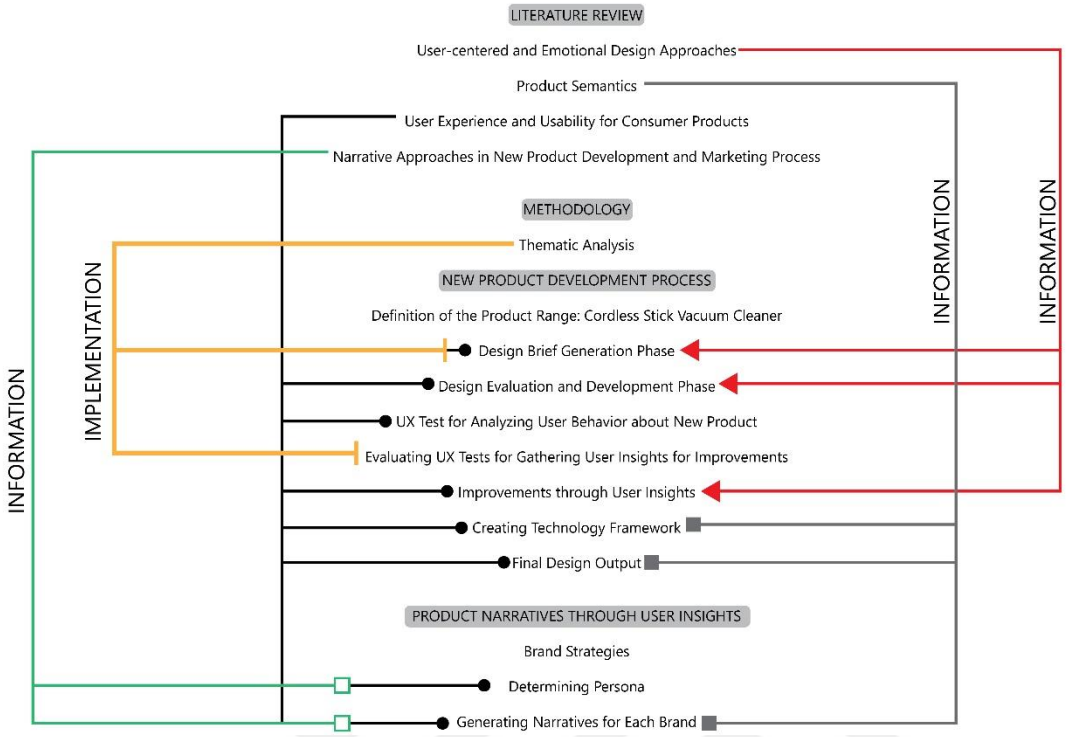

Figure 1.1: Structure and diagram of the study.

1.2 Literature Review

Through the aim and scope of the study, in the literature review section, relevant sources have examined and presented to provide a basis for the research. The review consists of four main subject matters in parallel with the new product development process of the Arçelik company, and the literature has referred and used in the NPD (in specific to design brief, user experience test, and technology framework phases) and narrative generation phases.

1.2.1 User-centered and emotional design approaches in NPD process

Robert W. Veryzer mentioned in his article -Discontinuous Innovation and the New Product Development Process- product developers (engineers, designers, etc.) generally want to achieve “the next big thing”; to reach value-added features for user, companies/organizations usually generated research and development studies that focus on innovation through consumer insights” (1998) [5]. For achieving these features, industrial design has a potential for creating distinctive and marketable products. However, in current situations, industrial design would not be enough alone;

it should use as a powerful tool for distinctive solutions in cooperation with other fields of professions. Consistently with this approach and in parallel with changing conditions and society, the discipline of 'Industrial Design' and its description has changed over time, and it is described by World Design Organization(WDO) as "a strategic problem-solving process that drives innovation, builds business success, and leads to a better quality of life through innovative products, systems, services, and experiences. It is a trans-disciplinary profession that harnesses creativity to resolve problems and co-create solutions with the intent of making a product, system, service, experience, or a business, better" (2019) [6]. According to these changes in industrial design discourse, as Vihma mentioned, design discipline has been moving into its related fields for example into marketing and business strategies, mass communication; also design and design outputs could be affected from technological and social/economic conditions, ergonomic possibilities, end-users' acceptance, and other similar issues (2012) [7]. The relationships and association between disciplines that involved in NPD, such as product management, R&D, industrial design, marketing, brand management teams, etc., are complex, and the function of each unit in the development process could have a significant reaction among output. According to Veryzer and de Mozota, multi-disciplinary design and development processes on NPD, have the power of enhancing of user-centered design approach that is integrating users' real need and expectation into design notions and features; by considering this, NPD processes in R&D labs that are generated only for fulfilling user needs, and expectations should complement through other disciplines (2005) [8]. Besides these functional features, while developing the NPD process in the scope of user-centered design approaches, it is also essential to show and transmit these created features to the potential user through making these features or products more attractive for communication. Demirbilek and Sener state that "the factors that can make a product more emotionally desirable, the essential features can be summarized as a distinction that makes a difference, exclusivity, and spirituality of consumption" (2001) [2]. Moreover, they also mentioned that products could be designed or developed for representing and reflecting the brand's identity or positioning strategy. In recent circumstances, companies realize the power and impact of excitement features among consumers, and they endeavor to distinguish their products in the competitive market by using emotion and semantic in their product development and marketing strategies (2001) [2]. Accordingly, Donald A. Norman mentioned in the book 'Emotional

Design' about the importance of emotions as, there is a relationship between user understanding and approaches of physical objects, emotion, and cognition. Scientists understand emotion is a significant and valuable issue in people's everyday life; "Sure, utility and usability are important, but without fun and pleasure, joy and excitement, and yes, anxiety and anger, fear and rage, our lives would be incomplete" (2004) [9]. About the importance of emotion in NPD and marketing processes, Richard Buchanan propound that NPD process should consist of three design elements that create a basis for product communication units which are; reason for believing technology, differentiated attributes, and emotion. Additionally, Buchanan mentioned that product designers and developers aim to stimulate the interest of target or potential consumers with strategies that refer to product attributes; however, their essential goal is not to ensure these attributes completely but to convey emotional means and messages to their products' potential consumer/audiences (1989) [10]. In similar to this point of view, Krippendorff mentioned a fundamental axiom that "…is that we do not see and interact with the physical qualities of things, but with what they mean to us; meaning construction is primary, function comes second" (2006) [11]. About the usage of emotions in user-centered design processes, in their paper Desmet, Porcelijn and van Dijk mentioned that to reach broad range of audiences, design for emotion in universal scale should be constructed through using value creation and in this way people may have similar approaches or emotions to generated value (2007) [12], and they referred to proposal model of John Terninko about differentiation strategy in consumer product while using three types of features that;

- Basic features: product features that expected to correspond to the basic needs of potential users.
- Performance features: product features that expected to distinguish from competing products in the market.
- Excitement features: product features that potential user does not think to encounter and would be pleased when features arise through innovation (1995) [13].

Besides, they proposed a framework as 'design for wow', in which aims to stimulate response and constitute surprising experiences in new developed products while taking into consideration basic, performance, and excitement features. Pieter Desmet

generated a typology of emotion types, according to his proposal, to conduct wow-experiences in consumer products, the output of the new product development process should have consisted with a composition of several features such as:

- pleasant surprise: to create an exciting experience, the generated product must be comprised of the unexpected attribute.
- desire: to create desire, the product must be composed of demands for purchasing or belonging with unique and value-added features.
- fascination: to create fascination, the product must-have features that unfamiliar and attractive (2003) [14].

So, if NPD processes conduct for creating wow-experience in a user-centered way, it could have an experiential, physical, and behavioral impact. "In that sense, design for wow can result in products that people are not only excited about to see–but also excited about to use and to own; independent of the inevitable future products that surpass its wow-impact with the newest up-to-the-minute excitement features" (2007) [12].

1.2.2 Product semantics

According to Krippendorff and Butter, "product semantics is the study of the symbolic qualities of man-made forms in the context of their use and the application of this knowledge to industrial design". Furthermore, they also mentioned that the approach deals with not only the physical and physiological features; it is also involved psychological and ethnical indices in the symbolic dimension; it is an effort for perceiving the conceptual meaning of objects/products through imagining their possible context and features. Through the semantic approach, product designers/developers have the power to explain innovative features of new products and enhancing the interaction between objects/products and their potential consumers (1984) [15]. Based upon this point of view, Demirbilek and Sener mentioned that product semantics as an effort to define convenient visual/physical messages or clues and integrating these messages or clues into product features. When product semantics approach applied comprehensively into NPD phases, products or solutions could occur more understandable, discoverable, and acceptable for users in physical and emotional dimensions. Through these semantic features, designers and companies are improving

the possibility of easy recognition, connection, and adaption between products and potential users (2001) [2].

1.2.2.1 Role and effect of semantic on marketing materials

About these definitions, product semantics is a study about the connection between potential consumers and the object/product; in addition, it is a significant attempt about consumer products' operational and social context in users' daily life. According to Demirbilek and Sener, these products have expression through their visual appearance, and they have interactions with their owner in context of usage, these interactions and messages created by designers and they could change depends on how designer use forms or meaning while creating structure of products/services, and it called as semantics (2003) [16]. So, product semantics considered as a communication tool between product and user; to constitute a coherent connection, Monö proposed four main semantic functions for products:

- To describe - its function, purpose, usage, and affordances
- To express – its value-added features and qualifications.
- To signal - its warnings, impulses, and reactions.
- To identify - its archetypes, range, category, and context [17].

So, through using these product features, product semantics plays a crucial role in developing a 'physical language' in products and to add a coherent set of visual indications that reflect functions, values, and context. From this point of view, when semantics approaches applied to industrial design processes, the product became sign and designers codify messages into products, and they build up communication with potential users. In conclusion, the importance of product semantics could have described as to conceive products with improved functionality, usability, and desirability to increase their chance of success in the competitive market. According to Krippendorff and Butter, product semantics considered as an approach of creating value and interpretation between human/consumer and object/product (1984) [15].

1.2.3 User experience and usability for consumer products

"Designing a product requires a detailed understanding of the people and the context it designed for" (Hassenzhal,2008) [18] and designers or product developers need

inspiration for building value-added features and ideas for consumer products. For understanding people needs and demands, designers or researchers should observe their potential users through conceived user experience research. The dictionary meaning of 'experience' from user and design standpoint, it is a connection between people and products or objects in everyday life. According to ISO FDIS 9241-210 definition of user experience "a person's perceptions and responses that result from the use or anticipated use of a product, system or service" and definition of usability is "extent to which a system, product or service can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use" (2009) [19]. Although there have been resemblances between usability and user experience approaches, they need to be handled separately in terms of their objectives and content. "Usability is usually considered the ability of the user to use the thing to carry out a task successfully, whereas user experience takes a broader view, looking at the individual's entire interaction with the thing, as well as the thoughts, feelings, and perceptions that result from that interaction" (Tullis and Albert, 2013) [20]. In another point of view, usability methods can have used for enhancing consumer performance among products, to improve this communication between products and users, user experience methods could be the proper tool for implanting both functional and hedonic goals (Bevan,2009) [21]. Hedonic goals are necessary for the experience itself and also future design or development process because user emotions and perception could give clues about attitudes that 'how' users interact with products, and they can have seen as resources for understanding about 'what' users experience.

For gaining insights from existing or past practices of users, designers or product developers should generate research activities focused on the interactions and communication between consumers and products. These research activities should consist of general features such as functional, visual, tactile, emotional, or perceptual for discovering and understanding user needs and approaches in a proper and user-centered way. Either for gaining general insight or evaluating a specific product, potential consumers became a central element of the design and development process, and it is essential to involve actual and proper users into experience sessions, and in the context in which they will possibly use the product in their real life. User involvements open the way for designing or developing more effective, safer and

value-added products and contributed to the user acceptance (Preece, Rogers, & Sharp, 2002) [22] and "the results of investigation, when used to inform product design, greatly extend simple usability techniques in differentiating particular products in the marketplace" (Forlizzi and Battarbee, 2004) [23]. While the new product development process progress, conceptual prototypes, which are trial versions of the objects, can be produced to use them to associate user approaches. At this point, designers or product developers would examine consumer insights that will help identify measurable usability criteria for being used to develop design features (Abras, Maloney-Krichmar, and Preece, 2004) [24]. According to Whitney Quesenbery "usability" is a proposal for products that work better for potential users, and usability can mean for various potential user;

- a result that includes from user consideration
- a process, also called user-centered design, for creating value-added products/services
- a set of techniques that could include scenic observations and usability testing for using to achieve consumer insights about contextual situations
- a philosophy of designing for actual user needs and demands.

Besides, she stated about usability could means more than just 'ease of use' and proposed -5 E's (efficient, effective, engaging, error-tolerant, and easy to learn) model- to describe the complex characteristics of usability. From this point of view, products/services should be developed through the combination of these characteristics that consider user needs to make products more usable and for success and satisfaction (2001) [25]. In parallel with this proposal, according to Dumas and Redish aims to achieve the following five goals, to:

- enhance the usability of product/systems
- implicate actual users in the research or tests
- give the users actual tasks to achieve
- enable test moderator to discover and record the actions of the participants
- enable test moderator to examine gathered data that gained and create layout correspondingly (1993) [26].

In a similar approach, Donald Norman recognizes the consumer approach and offers basic features for reaching practical and usable design solutions; products should be easy-to-determine about its actions, understand its whole operation, evaluate the current condition through its semantic instruction (1988) [27]. Also, Donald Norman consider user experience as an impulse through using three levels of processing; visceral level, for the elementary levels of performance and perception, behavioral level, for the levels of action specification and initial interpretation of the outcome and reflective level, for the development of goals, plans, and the final stage of evaluation of the process and proposed that these levels of understanding and stimulating ideas for these levels should be integrated as 'language' into product during the NPD process, and also into consumer experience or usability testing and communication tools for achieving the potential user (2013) [28]. From a similar point of view, UX strategist Frank Guo to define the objectives, purpose and contribution of using UX in NPD process; proposed a conceptual framework that consist UX elements (value, usability, adaptability, desirability) and their effects in Figure 1.2 (2012) [29].

Figure 1.2: The four elements of UX.

Designers or product developers, while creating, developing, or revising consumer products, should consider these experience elements. According to Sleeswijk Visser's approach, designers or developers have designed 'experiences' rather than products itself (2009) [30]. Moreover, the result and effect of design outcomes or subjective user experiences cannot control completely. However, designers have the power of guiding the potential users for better experiences while putting people and their experience at the center of the development process (Figure 1.3) and adjusting formal and behavioral qualities of design expressions to influence emotions (Suri, 2003) [31].

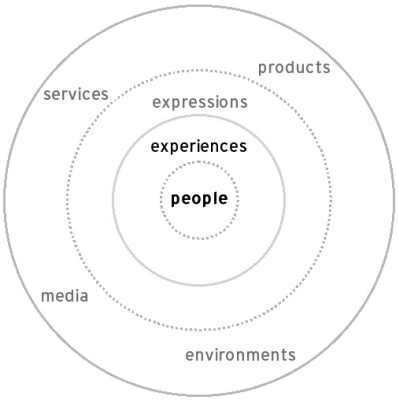

Figure 1.3: Putting people and their experience at the center of process.

Consumers generally processed various information while they evaluate new products such as; their existing product features, market information, contemporary trends, product categories, price, ergonomics, production, etc. These kinds of features support to create awareness for the potential user and possible contexts in which products could use in future scenarios. In the scope of this study, any experiences that consumers have in their everyday lives as input for design, development, and marketing processes. These experiences should be a starting point to provide insight into which contexts that product will be used, to expand the designer's horizon, and to enable the designer to create visions of how the product can support people in their everyday lives [30].

1.2.4 Narrative approaches in NPD and marketing process

Narratives could have described as a representation of a situation or process in a way to reflect or conform set of aims or values. This general description of narratives provides an opportunity to implement narrative methodology in various fields, and in this framework, several design studies discussed how narratives implement in design and marketing processes to reach potential consumers effectively. Narratives could have handled as the frame of their methodology, types, functions, applications, or their effects in design scenarios. In this study, narratives will be handled and examined as a tool for reaching potential users and consumers.

1.2.4.1 Brief description of narratives

It could be challenging to identify narratives through a single description or a set of features; because there have been very different forms of narratives in both social life and nature. People need to express themselves from their birth until the end of their lifetime, and they use different techniques for conveying their situations, feelings,

memories, experiences, etc. In this framework, narratives could have examined as the subject matter of different fields such as sociology, philosophy, linguistics, film studies, media, design, and many others; thus, its description and characteristics could have changed for each of these fields. However, there would be a common definition for all kinds of narratives; as a depiction of values, events, practices, aims, or situations, and they are also interpretation, encoding, and translation of tacit knowledge. As Blaylock mentioned, "...that conveys the meaning of an idea, person, or event through the description of a form, space, light, color, texture, or scale. The narrative is not a literal representation of what something is physically, but rather what it means to be" (2003) [32]. So, narratives would have considered as stories, and they are the blending form of fact and fiction, reality and imagination, and they exist with their narrator's way of thinking and conveying knowledge. Furthermore, these conveying narratives can serve for transferring complex tacit knowledge from one to another and also serve as a source of communication in the short term or long term; narratives can be thought as a medium that people describe and remember things or experiences. As Dunne mentioned, "…the ability of narratives to communicate ideas and to stimulate imagination allows the design to go beyond functional purposes and opens new perspectives to imagine, discuss and propose scenarios for the future as in design fiction" (2008) [33]. Narratives may act as a source of understanding and may also provide insight into decision making or the processes of knowledge transfer. Through compelling stories, the narratives become a mediator to construct and communicate intentions and impart knowledge from one to another. McKee stated about stories that storytellers does not only organize indices and information but also should evoke the audiences' interest through gathered insight and narration skills to create powerful and notable content. (2003, p. 52) [34]. The impartation of these user insights and knowledge would have practiced in several ways, but narratives that are told within their cultural and social contexts to create hypes with values and beliefs could enhance the power of their meaning and effect on their audiences. So, the more the meaning behind the 'things' are compelling, the more effect and penetration of these things will be successful in the cultural context. People live in a world of signs and artifacts; narratives are provenance of these signs and artifacts through their nature.

1.2.4.2 Role and effect of narratives in design and marketing processes

From the evidence of cave paintings and drawings to the present, people need to predicate their situations, values, emotions, or stories, and they expressed it oral, gestural or written. It is one of the basic and ancient instinctive behavior for humankind, like eating, surviving, etc. Similarly, in the design field, designers/creators need to express themselves to their potential users/audiences via their products/services. The design process first shows up with the notional and symbolic dimensions rather than physical dimensions; the raw ideas first belong with general concepts, and then they develop with details and storyboards through putting users center of the design process. As Forlizzi and Ford mentioned, narratives play a central role in the way people experience the environment and life, and they should though as crucial stimulation and vehicle for people to relate and remember experiences (2000) [35]. From this point of view, firstly, narratives could be considered as a way to link between users and experiences, and through these experiences as a way to understand users' demands and expectations. Secondly, intangible scenarios or narratives are also useful tool in the user-centered design process and marketing process. For instance, thinking and concept creation techniques like scenarios, user experience diagrams, user personas, and cultural research use in narrations to understand consumer approaches, gain insight for future concepts, to stimulate creativity, and as a result for transferring these insights into products and marketing materials. Moreover, in some design process, narratives could play a complementary but essential role in creating connections and instinctive experiences between object/product, context, and potential consumer. In this point of view, designers/narrators could have characterized as visual storytellers; they arrange visual elements via digital exploratory programs for creating narratives that to reach and impress their potential users or audiences. Accordingly, designers and narrators create immaterial indicants of objects, not object itself in early phases, through sparking imagination and creativity, showing and teaching values, and support with narratives; they also generate memorability, recognizability, and delighting for their products or services through media and advertisements (Grimaldi et al., 2013) [36]. The narrations are sometimes producing through designers and using with marketing teams, sometimes creating directly through marketing team while considering product concept and target group of users. As Jean Baudrillard mentioned in his book Simulacra and Simulation, "…the media represents the world that is more

real than reality that we can experience. People lose the ability to distinguish between reality and fantasy. They seek happiness and fulfillment through the simulacra of reality, e.g., media and avoid the contact/interaction with the real world" (1981) [37]. In this perspective, people live in a world of signs; the sign managed our individual and social life. The sign is a real commodity in people's life and cultural context. These signs have created through narrators of objects via narrations. Signs give people social values, status, and roles in their social environment. They create our world and personal identity. George Ritzer elaborates on Baudrillard's vision; Ritzer states that objects and commodities could have thought as signs, and relatively consumers use or dispose of these signs, and through these signs, they create statements about themselves (p. 349,1998) [38]. According to these views, to buy new experiences is to create identity, allow unlimited constructions of the self, and provide membership to assortments or populations. The pursuit of new experiences is the main mechanism of consumption, because consumption is meaningful within narratives, objects, and marketing techniques of these objects. Objects – commodities or narrations– signs evoke a variety of experiences in consumers. In this conceptualization, advertising should have considered as a tool to reach audiences via graphic design and other forms of advertising that are created by designers or narrators. For example, when the viewer sees a graphic narration of a designed object, they can see the object itself and besides, signs and meaning under the script. As an output of these expression methods, a good storytelling process or material could play an essential mediator role between expectation and reality while trying to reach potential users or audiences. According to Escalas' proposal which named as 'self-brand connection(SBC)', potential users or consumers try to relate and match their existing memories with information that has given as a narration of products which consist of signs and messages, consumer interrelate the brand perception with their short or long-time life experiences; they unconsciously create an SBC through marketing materials (2004) [39]. As a basic principle of narrative methodology "…human memory is story-based" (Schank, 1999, p. 12) [40], and according the Escalas, in these intended stories brands could present a product, tool, way or method for fulfilling the need or demand of consumer/user (2004) [39] while researching these needs in earlier stages of product development process. In relation to Escalas' conceptualization, Woodside referred that narrative methodology enhances SBC when stories involve indices that have shown needs and pain points of users' lives or mentioned significant emotional connections with

potential audiences. These indices create unconscious recognition, perception, empathy, and relation between brand or product, and potential consumer or user. These indices could be concepts, principles, mediums, ideas, product features, benefits, or combinations of these kinds of signs depending on project and target audiences for creating powerful stories. In parallel, the construction of these indices in marketing materials as a narration of products or services, is a crucial factor for transmitting core message to the listener or viewer (2010) [41]. Similarly, Stein & Albro mentioned that, in narrative notion, each unit that will consist of the whole concept of the story, should be formed and construct in an appropriate and strategic order for establishing powerful communications between products and target consumers (1997) [42]. According to these remarks, while constructing the marketing narratives, it is a necessary action that knowing and understanding the real and accurate needs, demands, emotions, thoughts, and insights of the potential audiences to achieve them through efficient strategies. Iannilli et al. stated that designed objects became important mediators while creating meanings and experiences in the context of physical or emotional context for their potential users (2015) [43]. However, consumers are knowing and seeking the existing market and are not satisfied with standardized products or services and desire for new experiences that encounter changing life conditions and demands (Castells, 2004) [44]. Therefore, to understand consumer demands and penetrate these demands, both design and narrations phases, user experience analysis, and consumer insight studies could be seen as inevitable applications. Stern at al. represented Derrida and Foucault's thoughts about consumption stories that, these stories connected with consumer needs and demands for satisfaction, and they are a mediator between brands, users, and marketing processes. (1998; Derrida, 1967/1982; Foucault, 1972) [45], [46], [47]. While gathering and transmitting insights for product communication, there could be a wide range of user data about tested product/services; Iannilli et al. proposed prioritization for gathered information as "to highlight some properties of an object means to put others in the background: exhibiting an object, therefore, implies a selection of conceptual, physical and semantic points of view" (2005) [43]. To narrate highlighted features of products for consumer stories, brands generally show these features with user, user benefit and the usage scenario between subject and object, product and user in symbolic, physical and psychological dimensions of these features in relation with the brand values and strategies (Aaker, 1991; Keller, 1993) [48], [49]. While producing a narrative of experiences and layers of meaning for objects or

products, there can be multiple stories for brands and users via the different relationship with the subject and object and by way of different features of the object (Iannilli et al., 2005) [43]. According to Quesenbery and Brooks, narrations in related with user experiences, serve to create a ground for the design process, explain features and needs but also place them into a real context, and also can be used in many ways such as;

for collecting, sharing and using insights about users, tasks, and goals

to spark new communication ideas and enhance collaboration and innovation

to explain thoughts and create a common perception

to comprehend the mediums through sharing insight about others

to convince others for value creation (2010) [50].

In parallel with this conceptualization, Stickdorn and Schneider mentioned about storytelling approaches as a method for sharing user experiences and insights, and it can have transferred in many ways [51], accordingly, Pruitt and Adlin stated that eight primary indices for creating effective user stories;

- Goal
- Persona
- Other characters
- Situation before the story begins
- Goal of the main object
- Stimulation for the action
- Context of the story
- Outcomes of the story (2006) [52].

In conclusion, the main findings show that UX outputs and consumer insights valuable inputs for creating marketing narratives and reaching potential users for consumer products; they are ways that present new designed products or services in an appropriate way while understanding user needs and emotions.

1.3 Methodology

According to the presented literature, in this study, firstly, the new product development process, will be expounded to provide basis and background for communication materials. Secondly, existing user research about the product range and communication materials of the previous version of Cordless Stick Vacuum Cleaner and then conducted user experience testing reports for new developed version of Cordless Stick Vacuum Cleaner have examined while using qualitative thematic analysis method for the dataset. The analysis carried out firstly, to propose design brief, then to generate a technology framework and to crate basis of marketing materials for the final phase of the study that will reach potential users. According to Boyatsiz, thematic analysis (TA) have identified as "a way of seeing and analyzing qualitative information" (1998) [53]. In parallel with Boyatsiz's point of view, Braun and Clarke identified TA as an effective method to define, examine, organize and describe compiled themes through raw data, and they mentioned remarkable advantages of thematic analysis methods. TA is;

- flexible to use in qualitative data,
- functional methods for participatory research samples,
- efficient way to extract and conceptualize key themes and meanings from a large body of data, to implicate latent consumer insights and produce qualitative reports (2006) [54].

Besides, TA generates consolidated information as a result of underpinning the most remarkable codes, statements, and meanings from analyzed material (Joffe, 2012) [55]. Thematic analysis method mainly provides the characteristic of content analysis, which is another primary qualitative analyzing method, but TA also allows to integrate analyzed data with meaning in research's main context (Joffe & Yardley; 2004, Neuendorf; 2019) [56] [57]. To reach remarkable themes and inferences from qualitative research, Braun and Clarke propounded an iterative six-phase process for thematic analysis that consist of from codes and themes, could be seen in Table 1.1; themes should be considered as general substances about research question and main motivation, codes defined as features and keywords of data (2006) [54]. According to this categorization, TA could be handled with different approaches; inductive or deductive way, semantic or latent way, realist, or constructionist way. In this study,

TA has implemented through inductive and latent approaches. In the inductive approach, coding and theme construction shaped according to the content, not shaped or directed by previously studied (deductive way) concepts or ideas; in latent approach, codes and themes consist through underpinning the data; the messages are not explicit. (Braun, Clarke & Rance, 2015) [58]

Table 1.1: Phases of thematic analysis.

Phase	**Description of the process**
1. Familiarising yourself with your data:	Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas.
2. Generating initial codes:	Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
3. Searching for themes:	Collating codes into potential themes, gathering all data relevant to each potential theme.
4. Reviewing themes:	Checking in the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic 'map' of the analysis.
5. Defining and naming themes:	Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells; generating clear definitions and names for each theme.
6. Producing the report:	The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.

2. NEW PRODUCT DEVELOPMENT PROCESS OF CORDLESS STICK VACUUM CLEANER

Depending on changing living conditions and living spaces, there are also changes in consumer products that have great importance in people/user life to make their lives easier and more comfortable. While taking into consideration shrinking living spaces, it has been seen inevitable for the leading brands to develop and present innovative products that can address the user's life in the competitive market.

2.1 Definition of the Product Range: Cordless Stick Vacuum Cleaner

A vacuum cleaner is kind of a household that uses an air pump and creates partial cleaning to suck up dust and dirt from floors and other surfaces. Stick Vacuum Cleaner, which is a kind of vacuum cleaner, is an innovative everyday product that offers practical and ergonomic cleaning experience to users. The main advantages of this product group could be described as;

- Flexibility and ease-of-use
- Ergonomy
- High suction power
- Practicality
- Cordless design
- Convenience for practical cleaning
- Safety by comparison with conventional corded vacuum cleaners

2.1.1 Design history and development about product range in scope of Arçelik company

When we look at the history and development of the stick vacuum cleaner, it has been seen that the archetypes of these products emerged in America and the United Kingdom, but the first domestic vacuum cleaner that resembles the contemporary

models invented in 1905 by Walter Griffith with a manufacturer in Birmingham, England. (http://www.thepeoplehistory.com/vacuum.html) [59].

After this development, James B. Kirby invented the vacuum machine in 1906, called the "Domestic Cyclone", which is the first portable vacuum cleaner that had a motor was an invention of James Murray Spangler. This machine had a rotating brush, electric fan, a box, and a bag for dust, and the idea sold to William Henry Hoover in 1908. Hoover redesigned the vacuum cleaner by placing it in a steel box and designing attachments for the hose. He later added disposal filter bags and designed the first upright vacuum cleaner in the 1920s (Figure 2.1).

Figure 2.1: The first upright vacuum cleaner.

Besides, in early periods, the vacuum cleaner was a luxury consumption, but after the Second World War, middle classes could afford it, and it slowly became a part of many house's everyday life products. In the present, there are many different types of vacuum cleaners in the market, and most of them moved by hand, but there are different types that have their moving power or include even robotic. (http://www.vacuumcleanerhistory.com/) [60]. According to The European Commission's study of vacuum cleaners, main types of vacuum cleaners categorized as; mains operated and hybrids, cordless and robot vacuum cleaners, and shown in Figure 2.2 [61].

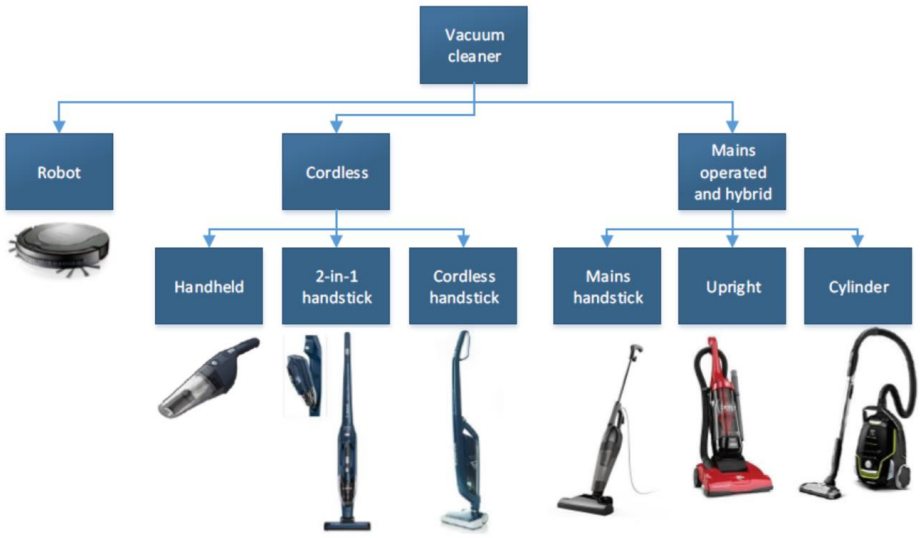

Figure 2.2: Main types of vacuum cleaners.

In the scope of Arçelik company, there is a preliminary product -in specific to cordless stick vacuum cleaner category- before the new developed product. This product was not developed within the company, but as a step for taking place in the existing stick vacuum cleaner market; it has been received from a supplier as off the shelf product and designed with face-lift method while changing product color and put on the market associated with Beko brand.

2.1.2 Design motivation for new product

In the light of the user and trend analysis conducted by Arçelik company and contractual research agencies, it has analyzed that the global small appliances industry registered continued volume growth in 2018. Growth in the forecast period will be fastest, as consumer purchasing power continues to rise in these regions; as a result of these consumption changes, the six key trends will be shaping the industry over 2018-2023. According to an independent provider of strategic market research company's report, in the scope of the SDA market, robotic and stick vacuum cleaners expected to grow densely for the next five years, and also some major trends will be shaping the household market. These trends forecasted as;

- Healthy living: Consumers worldwide remain reliant on appliances to support and nurture healthy habits. Healthy living is achieved not only through good consumption habits but also through clean and healthy homes. Healthy living aspirations continue to shape category innovation and growth, resulting in

positive prospects for a range of small appliances. Healthy diets and hygienic homes set to remain at the forefront of healthy living.

- Connected consumers: Ongoing development of digital infrastructure will continue to propel the growth of connected homes.
- Consumption upgrades: Consumers are trading up to more sophisticated appliances and products, and they expected to continue to do so as incomes rise, and habits and expectations evolve.
- Multifunctionality: Consumers expected the answer their needs and demands through less products by multifunctional solutions in their shrinking living spaces.
- Premiumisation: As incomes continue to rise, particularly in emerging regions, consumers expected to make discretionary upgrades, including trading up to higher-end models or switching from manual products to automated electrical appliances.

Based on these megatrends, Arçelik company has been set focus trends for new developed products as; healthy living, connectivity, multifunctionality, and premiumisation (Figure 2.3).

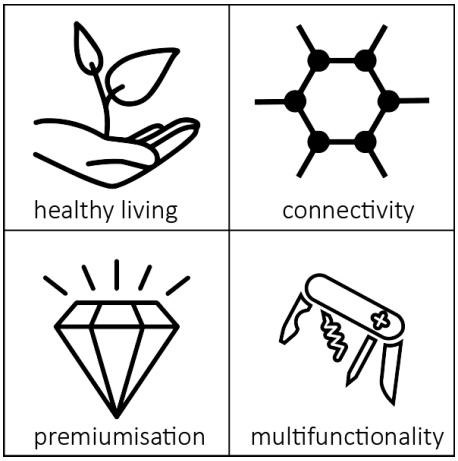

Figure 2.3: Focus trends.

So, for creating and developing value-added products or services, companies should integrate these trends separately or as a combination of them into new developed products or services. According to Major Appliances Global Industry Overview in specific to stick vacuum cleaners, the primary motivation is promising to user more premium, functional and user-friendly features and also set to perform well over the

forecast period, because stick models are lighter and easier to handle, and are suitable complements to smart future of household (2019) [62]. In the scope of Arçelik company, while taking into consideration of market condition, global trends and users' changing life, habits, needs, and expectations, it has been seen necessary to develop and produce value-added, sophisticated and functional products to present and place into the global market and consumers' houses. In specific to the 'stick vacuum cleaner' range, the company should go beyond across the preliminary product. The existing product named as 'PractiClean™', is accessible in the European market through the Beko brand, the new product will address both national and international markets with three company brands as Arçelik, Beko, and Grundig.

2.2 Design Brief for New Cordless Stick Vacuum Cleaner

Design brief is a description of a design and development study and also the possible scenarios, infrastructure, and constraints of the project, roadmap, and concepts to find and develop design ideas for product/services (Philips, 2004) [63]. In other words, a design brief could be thought as a written, verbal, or visual explanation that includes purpose, features, and milestones of a design project in a professional context. Design brief have power to define the scope, aims and objectives for both new product concepts and people (designer, developer, product manager, etc.) that involved in the development process (Read and Bohemia, 2011) [64]; it should include most significant formulas for research and design project such as features, deadlines, particular information, etc. (Brun et al. 2009) [65]. The strategic brief must begin with analyzing needs, concerns, and insight of the user, but also should involve visionary statements that user may want in the future for a functional change and make a meaningful enhancement of existing facilities (Nutt, 1993) [66]. From a similar point of view, Blyth and Worthington stated that the design brief is a critical study for understanding and transferring users' and organizations' needs, demands, resources, goals, and missions; also, it is an essential theme for the formulation of change of projects/products. Also, they mentioned that briefing process should consist of three phases such as;

- pre-project phase; when the consumer insights/needs/demands gathered and analyzed, features, details and framework of project defined and the design brief generated.

- project phase; when design and development teams construct and maintain the concept and user expectations in rational ways.
- post-project phase; when the evaluation of aims and features, also preparing for communication stages begins to reach target consumer (2001) [67].

In similar, design brief also considered as a checklist to evaluate features and output of the design study as mentioned "the design brief and specification could be the initiating force which both precedes the development of design proposal and functions as a checklist to evaluate them" (Tovey, 2015) [68].

In conclusion, according the referred literature, design brief must represent at least; the primary and additional needs, demands or insights of the consumer, main objectives of the project, product features, competitive analysis of related product(s), and scope of the project with coherence and balance, for creating effective mission statement, products, and relations.

2.2.1 Analysis of user approach and user behavior about vacuum cleaner

To analyze and understand consumer needs and behavior before the generating phase of the design brief, the latest qualitative user perception and product evaluation research (applied by Arçelik company and contractual research agencies) in Turkey and Europe have examined to select related information and outcomes for new product development process. The complete data has identified through thematic analysis method that has been described in the methodology section, to mine, and subtract consumer opinion about product range as 'codes' and developing 'themes' from these opinions. According to Braun and Clarke's thematic analysis method [54], the main layout and the necessary information of this research will be handled and categorized as phases.

2.2.1.1 Phase 1 (familiarizing with the data)

In this study, the main objective is to understand how the perception of quality is associated with the vacuum cleaner product category and which elements or features constitute the quality perception in consumer minds. Through these research; the general perception about vacuum cleaner has been examined and understood, besides how the visual or functional properties of the products in each category, affect product quality perception have been determined through trying to be questioning and

understanding the basic demands, opinions, and needs of the consumers from different socio-cultural basis.

2.2.1.2 Phase 2 (generating and elicitation initial codes)

When the content of the research has scanned, there could be seen some general roots and questions such as;

- demographical information of participants (18-54 years old, 150 users in total living in Istanbul and Europe who are vulnerable to buy/use small home appliances),
- what the quality perception means in the minds of the consumers/users and what it means,
- how the concept of quality defined in the products that determined in specific categories,
- how Arçelik and its competitors relate this concept and its reflection in products.

According to the inferences of users, the vacuum cleaner considered as the most essential small home appliances that provide cleaning in the house. Vacuum cleaners described as a convenience and practicality under the favor of to be able to clean "dust and dirt" in the environment with a vacuum cleaner in modern way instead of old-fashioned hand cleaners. Sweeping is not a liked home business (like ironing); It seems to be dealing with dirt-dust. Vacuum cleaners have seen as essential helper or assistant that facilitate user life and cleaning processes.

It is believed that cleaning the house cannot be carried out without a vacuum cleaner; therefore, it is an essential product for the everyday life of the user. It is seen as a timesaving and practical product compared to the old-style hand brooms and does not tire the user.

By means of convenience that consisted of user life through its practically, it is seen that users are convinced of the performance/technology of different kinds of vacuum cleaners and volunteer to experience almost every product types released in time.

Consumers generally use and prefer their previous brand and product with in an emotional way. Ethnographic observation shows that sweeping frequency is 2-3 times a week.

There are main subject matters that provides recognition about products in consumer/user's mind such as; brand recognition, performance, previous usage experiences, product features, product design effect/recognition, marketing effect/power.

2.2.1.3 Phase 3&4 (searching for themes and reviewing themes)

According to deducted codes of data set, it has consisted of main relevant groups of these codes. They could categorize as below;

- the primary purpose of research/research question and related motivations
- target group and demographical information
- user approach and experiences about vacuum cleaners
- brand recognition and usage scenarios
- product quality, product recognition, perception and purchasing process

2.2.1.4 Phase 5 (defining and naming themes)

- General concept and sampling details
- The role of vacuum cleaner in user life and related motivations
- User approaches, needs, and experiences
- Purchasing decisions and process
- Quality perception: how can quality identified?
- Brand recognition and marketing materials
- Product features, performance and design

2.2.1.5 Phase 6 (producing the report)

According to analyzed and coded research, the main consideration of ideal vacuum cleaner ideas, needs, and demand come to fore in the mainframe.

- General concept and sampling details
- The role of vacuum cleaner in user life and related motivations: There are both rational motivations such as shortening cleaning time and reducing effort, providing deeply cleaning in an easy and practical way and also emotional motivations such as deriving order and cleaning spaces in home to whole family in a practical way with guarantee of successful outcomes, seeing as a helper in routine for vacuum cleaner as an everyday product of consumer life.

- User approaches, needs, and experiences: Durability, suction power, usability for different floor types, performance, sound, dimension/size/weight, and accordingly functionality and ergonomics of the product are the most important criteria that affect both the perception of the product, brand, and quality.
- Purchasing decisions and process: There have been analyzed mainly different types of purchasing behavior, some purchases occur need-driven with urgent need; some purchases do not follow a need but are just want-driven. It has been observed that there are spot & buy purchaser and pre-informed purchaser; people that do not have immediate need check prices, reviews and tests, marketing materials. Therefore, it is crucial to develop a product that has high-quality perception and marketing materials such as swing tags, brochures, banners, posters, etc.) for enhanced interaction with consumers and memorability.
- Quality perception: The assessment of the quality perception of products cannot be measured one single element/feature. Motivations that drive or effect by each criterion also differ within themselves. Therefore, for quality perception, it is crucial to focus on the overall design and scenario. In the perception of consumers, it is observed that quality concept has sub-components, and description is consisting of these elements. Elements of quality that affect the perception of the vacuum cleaner in the minds of consumers could combined as; brand recognition and effect, performance, presented experience, design perception, and product features.
- Brand recognition and marketing material: Previous experiences and recommendations from siblings/neighbors/friends are effective guiding factors, and it has been analyzed that some brands come to the forefront according to the consumer experiences. There is a tendency for brands in specific to vacuum cleaner category that are trusted, which are not expected to cause problems and that is believed to stand behind the product even if problems arise — having problems with the brand related to the product or service affect the brand perception negatively and affects the purchasing preferences.
- Product features, performance, and design: It has been seen that technological functions are directly related to long-term use. It has been seen that the material of the product is directly related to performance and durability. Durability and

ergonomics of the products are related to long product life with consumer life, and should be considered as critical selection criteria. It is important to get durable and functional cleaner, but the design decisions of the product create the first idea about the product. The attraction of design, desire to examine it, and the perception of quality are effective in the purchasing decision of the product. According to the consumer insights, an ideal vacuum cleaner should have;

- High suction power for effective cleaning and guarantee for successful results
- Sufficient design details and technological appearance
- Having an effective dust filter to unsure healthy cleaning
- Flexible, compact and durable design (hose, handle and the main body)
- Durable, non-scratch exterior material and long-life product
- Silent operation
- Flexible/durable hose and handle and the main body
- Ideal weight and dimension, ease of hold and grip (ergonomics), easy to move and manage, accessible and compatible storage solutions
- A dust container with sufficient capacity, easy to remove and clean
- Comfortable and easily understandable directions and buttons.

Besides these features, it has been analyzed some additional features or ideas that can differentiate the product on the market;

- Have a spare or removable/excisable dust filter
- Having a long-lasting battery or operation time
- Different technological functions
- Control mechanism through the handle

In conclusion, through thematic analysis methods, the dataset has been analyzed and deducted, the primary notion from consumer approaches has encapsulated to use the insights and knowhow while design briefing and product development processes.

2.2.2 Identification of technical and physical features of the project

According to user and market needs, demands and trends, conducted and analyzed consumer research, and the light of the previous version of stick vacuum cleaner product, the technical and physical features of the new product have been determined through all

these inputs within collaboration of R&D and product management teams. As previously mentioned, Arçelik company has been set four trends that will be focused on new product development and marketing processes for SDA categories as; healthy living, connectivity, multifunctionality, and premiumisation. The product will consist of the main tree part described as a body, tube, and brush. The body part formed from the integration of central units such as; motor, dust bin, dust filter, battery, operational handle. In detail, with the guidance of all these notions, the new developed stick vacuum cleaner should have;

- Ideal weight and dimension, ease of hold and grip (ergonomics), easy to move and manage, comfortable, and compatible storage solutions.
- High suction power for effective cleaning and guarantee for successful results.
- Having an effective removable and washable dust filter to unsure healthy cleaning.
- Comfortable and easily understandable directions and buttons.
- Three-level speed settings can be controlled from product handle.
- Dust bin that can be open with a single button trigger, with sufficient capacity, easy to remove and clean.
- Li-ion 28,8 V battery that allows long operation time.
- Hard floor brush and carpet brush (alternative 1) that removable and easy to clean.
- Single brush designs can be used on carpets and hard surfaces (alternative 2)
- Foldable tube for ergonomic and horizontal use.
- Charge/parking station (portable, wall-mounted, self-standing)
- Accessories (pet brush, soft brush, extension wand, crevice tool)

2.2.3 The generated design brief for the new project

According to the synthesis of the studied and discussed information up to this phase, the main motivation is; promising to the user more premium, functional, and user-friendly features and also perform well among the competition. Through this motivation, the design brief has been generated to define and transfer the scope, aims, and features for a new product concept and has been shared with the industrial product design team. An effective design brief should include the most significant indices for research and design projects such as features, deadlines, users' needs, insights, demands, and organizations' concerns, resources, goals, and missions; also, it is

important theme for the formulation of change of projects/products. (Brun et al.;2009, Blyth and Worthington;2001) [65] [67]. In the light of achievements, the generated design brief has consisted of several steps. In this section, the layout, content, and main details of the conducted design brief have been explained shortly; the generated design brief had consisted of 23 pages that includes images, samples, details, and directions for design study.

2.2.3.1 Project title and description

The temporary title of the project has been selected as Rocket 2in1 Battery Powered Stick Vacuum Cleaner. It is expected to design and develop value-added, sophisticated and functional stick vacuum cleaner; and to present and place into the global market and consumers' houses through its unique technical features and holistic design elements, effective material usage, and directions to reach technological appearance and robust design to appeal user interest.

- Target market: Turkey, Europe
- Brands: Arçelik, Beko, Grundig

2.2.3.2 User needs and demands

According the conducted user research; the main demands of consumer could be summarized as; high suction power for effective cleaning and guarantee for successful results, technological appearance, silent and long battery operation to use vacuum cleaner any time of the day, effective dust filter to unsure healthy cleaning, flexible and durable design to use product for long time, ideal weight and dimension, ease of hold and grip (ergonomics), easy to move and manage, easy and compatible storage solutions, removable and easy to clean dust container with sufficient capacity, easily understandable directions for easy, comfortable and seamless operation experiences.

2.2.3.3 Existing product details

Existing product(s) details: The existing product named as 'PractiClean™, present as a reference to design team for creating knowhow about stick vacuum cleaner category. Existing product image (Figure 2.4) and technical features has been shared for detailed overview. Shared details in design brief can be seen in below;

- Two-level speed setting(minimum-maximum)

- Dust bin capacity: 0.5 L
- Weight: 2.7 kg (with brush)
- Removable and easy to clean filter
- Easy to clean brush
- Battery charge indicator
- 21.6 V li-ion battery
- Power: 130 W
- Operation time: 40 minutes
- Charging dock
- Accessories: Crevice tool, 2 in 1 dust brush

Figure 2.4: Existing product image.

2.2.3.4 Competitive products

In design brief, for achieving desirable products and solutions, to take the best products/solutions of leading brands in the marketplace as a reference, and to differentiate from these brands in a competitive environment, chosen prominent benchmark products in stick vacuum cleaner category have been presented. The sample products have been examined through their distinctive features and usage scenarios to serve as a sample for the industrial product design team. These competitive products had been decided through product management and R&D teams in the scope of the product segment.

2.2.3.5 Product description, features and technical details

In this section, the aim and description of the product's technical features, constraints, and expectations defined clearly through the structure model of vacuum cleaner constructed by structural design in R&D team to give industrial design team as a reference model. Stick vacuum cleaner is an innovational product category that provides users easy, functional, and reliable user experience, and it consisted of primary parts, which are the main body, tube, brush, accessories, and dock station. In the scope of the design brief, physical and technical explanations, dimensions through user expectations and ergonomics standards, adjustable details, and constrains through reference CAD model, additional requests have been explained clearly to ensure the framework of the design study. According to outputs of the user research and previous studies, the main features of the stick vacuum cleaner set as;

- Power: 170 W (the highest suction power in the world)
- Collapsible tube for flexible usage
- Ideal weight and dimension, ease of hold and grip (ergonomics), easy to move and manage, easy and compatible storage solutions
- A dust container with sufficient capacity, easy to remove and clean
- Weight: ~2.5 kg
- Both carpet and floor brush
- Three-level speed setting(I-II-turbo)
- On/off button
- Removable 28.8 V lithium ion battery
- Battery charge indicator
- Removable and easy to clean filter
- Removable and easy to clean brushes
- Maximum operation time: 50 minutes, Turbo mod operation time: ~7-8 minutes
- Control mechanism through handle
- Charging/docking station to store accessories (pet brush, soft brush, extension wand, crevice tool)
- Serigraphy applications to highlight essential features such as suction power
- Technological appearance
- Easily understandable directions.

In conclusion, design briefing could be seen as an origin point for a design study and the beginning of the product story; besides, it has been used as a checklist and guideline for the rest of the study.

2.3 Design Evaluation and Development Phase

According to the constructed design brief, the Industrial Product Design team has been proposed a design output to R&D, product, and brand management teams. As mentioned before, according to Blyth and Worthington, the briefing process should consist of three phases. Firstly, the pre-project phase, when the consumer insights gathered and analyzed, the framework of the project defined, and the design brief generated. Secondly, the project phase, when development teams construct, maintain, and test the concept and user expectations in rational ways. Lastly, the post-project phase, when development phases and features also finalized preparation for communication stages begins to reach target consumer (2001) [67]. In addition, the design brief could be seen as a checklist to evaluate the features and output of the design process (Tovey, 2015) [68]. From this framework, the design output should be checked through the design brief to verify and begin the realizing phase of product design. It has been analyzed that the proposed design has been ensured a great majority of the visual features have been requested in the design brief. The visual presentation of the design proposal has been analyzed through visual content analysis methodology to decide accomplished features and to be improved features systemically. Content analysis "is a research technique for making replicable and valid inferences from data to their context" (Krippendorf, 1980) [69], and the data should be studied through four steps as; defining data, devising categories for coding, coding the data and summarizing the results (Rose;2001, Margolis and Pauwels,2011) [70], [71]. Through this framework, the analyzed indicants of features given in Figure 2.5 and Figure 2.6 through confirmed, to be examined and unexpected features, and the coded theme of features given in Table 2.1, as;

- confirmed,
- have not confirmed and
- to be examined specifications while taking design brief as a reference structure.

Figure 2.5: Design output and analyzed features of design proposal.

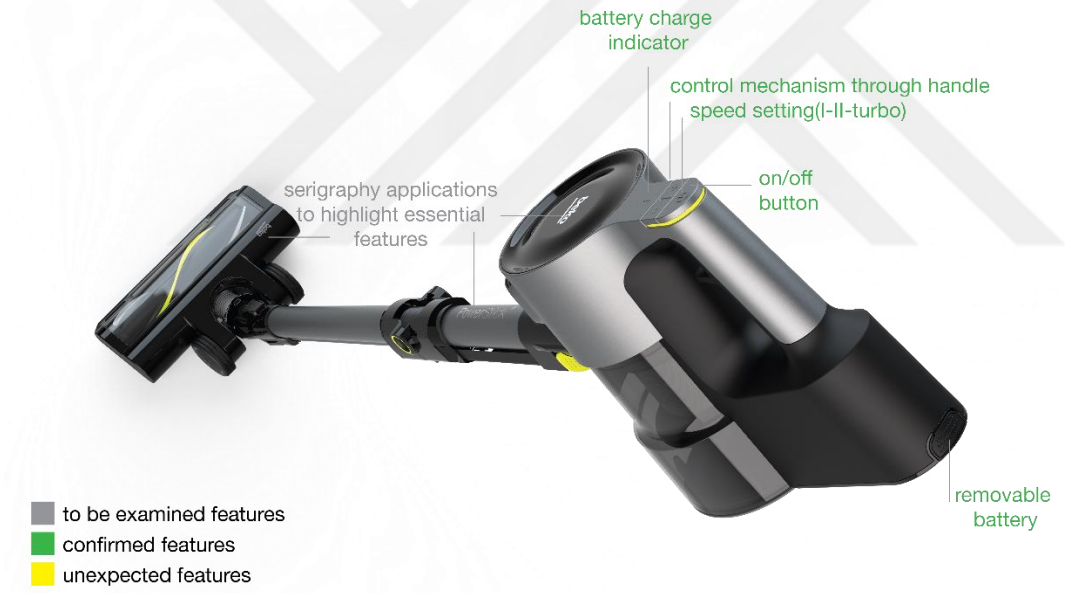

Figure 2.6: Design output and analyzed features of design proposal.

Table 2.1: Analyzed features of design proposal.

Power: 170 W	to be examined in performance test
Collapsible tube for flexible usage	confirmed
Ideal weight and dimension, ease of hold and grip (ergonomics), easy to move and manage, easy and compatible storage solutions	confirmed as visually, but to be examined in UX test
A dust container with sufficient capacity, easy to remove and clean	confirmed as visually, but to be examined in UX test
Weight: ~2.5 kg	to be examined
Carpet and floor brush	confirmed
Three-level speed setting(I-II-turbo)	confirmed
On/off button	confirmed
Removable battery	confirmed
Battery charge indicator	confirmed
Removable and easy to clean filter	to be examined in UX test
Removable and easy to clean brushes	to be examined in UX test
Maximum operation time: 50 minutes, Turbo mod operation time: ~7-8 minutes	to be examined in performance and UX tests
Control mechanism through handle	confirmed
Charging/docking station to store accessories	have not confirmed
Serigraphy applications to highlight essential features	confirmed but to be developed
Technological appearance	to be examined in UX test
Easily understandable directions	to be examined in UX test

After the first evaluation of the design proposal, feedbacks about not confirmed product features have been shared with the Industrial Product Design team to request revision about these features, such as charging/docking station design, before the UX tests. Required revisions accomplished from Industrial Product Design team and completed design data have been started to be studied to handle mechanical design and preparation for production. After the iterative industrial and structural design processes, the design output has been prepared as a functional prototype for generating UX test to gather and understand remarks and insights about the cordless stick vacuum cleaner. The design output that has been used in UX tests could be seen in Figure 2.7 and Figure 2.8 as render images.

Figure 2.7: Design output of cordless stick vacuum cleaner with charging/docking station.

Figure 2.8: Design output of cordless stick vacuum cleaner with illumination feature.

2.4 UX Test for Analyzing User Behavior and Gathering Consumer Insights

As mentioned before, according to Abras et al. stated that through the NPD process, conceptual prototypes (limited and trial versions of the product/artifact) could be used for user testing to analyze consumer insights that will help identify measurable usability criteria for being used to develop design features (2004) [24]. From this perspective, for analyzing and understanding consumer insight, approach, behavior and feedback to make improvements if it is necessary, finalize the design and development phase, and create a basis for product story and marketing materials; user experience and usability studies have been conducted through the first prototype of the developed product. Research have been carried out in target markets of the project which are Turkey and Europe, through the users whom currently has the stick vacuum cleaner and vulnerable to replace, to understand their behaviors, ideas and remarks about their existing vacuum cleaners, competitive products that decided while design briefing process and the new developed stick vacuum cleaner prototype. Research has been applied to 20 participants in Turkey; 30 participants in Europe (France, Germany, and United Kingdom). The examined points were constructed for both studies commonly and the main research questions listed below;

- What is the size of the consumers' apartment/house? Which types of floorings consumers have in their house?
- What kind of vacuum cleaner consumers use at home?
- For how long have consumers been using a Cordless Stick or 2 in 1 Stick Cleaner? What are the thoughts on these types of vacuum cleaners?
- What is the motivation/demotivation of using stick vacuum cleaners?
- What are the role of vacuum cleaner in user life and related motivations?
- What kind of features affect purchasing decisions and process?
- How do they describe their vacuum cleaner(s) emotionally?
- How often do consumers use the vacuum cleaner? (once / twice a week, every day, etc.)
- How long do consumers use the vacuum cleaner on a regular cleaning day?

- Where do consumers use their vacuum cleaner at home during the cleaning? Where do consumers not use it?
- Where do consumers put their vacuum cleaner mostly after they completed the cleaning? Where do consumers place it at home?
- Do consumers have any difficulties in using the vacuum cleaner at home? Do consumers have any bad experiences about the vacuum cleaner? Why?
- What are the thought and comments about competitive products and a new developed stick vacuum cleaner that experienced?

2.5 Evaluating UX Tests for Gathering Insights for Improvements

Research data had been identified through thematic analysis method, which has been described in the methodology section and used in analyzes of user approach before the design brief phase, to subtract consumer insights about product range as 'codes' and developing 'themes' from these opinions. According to Braun and Clarke's thematic analysis methodology (2006) [54], the main layout and the fundamental information of this research will be handled and categorized as phases.

2.5.1 Phase 1 (familiarizing with the data)

When the conducted usability and user experience research examined in general, there could be seen that some critical information gathered and understood such as; main habits and approach of consumers, why and in which situations consumers need to stick vacuum cleaners, motivation and demotivation about purchasing and using stick vacuum cleaners, insights, and remarks about stick vacuum cleaner. Research have been built in orderly and had some focus points, first gaining about general insights and approaches, then experiencing products through performing mandatory tasks depends on the product usage scenarios such as; cleaning the carpet, cleaning the hard floor, folding/flattening the tube, charging and changing the battery, changing the brush roller, operating with turbo mode, vertical parking feature, cleaning the dustbin, using and changing the accessories (the crevice brush, mini turbo brush, the soft brush and elbow tool).

2.5.2 Phase 2 (generating and elicitation of initial codes)

According to studies carried out, key expressions come forward among the dataset and these notions could be gathered as;

- Daily cleaning and big cleaning are differentiated by its usage frequency and the devices/materials used to clean the house. While the big cleaning refers to cleaning the entire house with the vacuum cleaner and the help of supportive cleaning liquids and materials, the daily cleaning mostly includes the cleaning of the general living areas, such as living room, kitchen and restrooms with the help of vacuum cleaner only.
- The usage areas of different types of vacuum cleaners (cannister, cordless motor on body and motor on handle types) varies due to their functionality, size, power, storage, cleaning and etc.
- Users who own both canister and cordless stick vacuum cleaners mostly prefer to use the stick vacuum cleaners only for daily cleaning due to their short battery life and insufficient suction power.
- The type of the users' houses (size, levels) and the type, shape, the design, appearance and the brand of their vacuum cleaners affect the way how users store their devices. If the product looks durable, technological and premium; consumer tend to display their vacuum cleaners in their living spaces (living room, kitchen etc.) as a part of a decoration of their houses and status symbol among their relatives, friends etc.
- Users who live with a pet or a child tend to clean the general living areas such as living room almost every day in order to clean the pet hair. The everyday cleaning is mostly done by only using the vacuum cleaner.

2.5.3 Phase 3&4 (searching for themes and reviewing themes)

According to re-evaluation of deducted codes, there had been consisted main relevant groups for the highlighted keywords of these codes. They could be categorized as;

- Cleaning process and related motivations
- User approach, experiences, and pain points in specific to stick vacuum cleaners
- Product quality, perception and purchasing process
- Usability test of new developed stick vacuum cleaner

- General findings
- Significant findings for improving the product

2.5.4 Phase 5 (defining and naming themes)

To create common theme for elicited codes and related insights, the codes evaluated on a map (Figure 2.9) according to their relevance with other codes. The common roof extracted from map could be categorized as follows;

- Types of cleaning
- Product features, perception and purchasing decisions
- Vacuum cleaner preferences and pain points
- Storage preferences
- User experiences and remarks about stick vacuum cleaner

Figure 2.9: Defining themes process.

2.5.5 Phase 6 (producing the report)

- Types of cleaning: Daily cleaning and big cleaning days are differentiated with its frequency, the vacuum cleaner type and the supportive cleaning materials that are used during the cleaning. The size of the house, existence of children and pets are some of the main factors for the cleaning behaviors. Most common findings are listed below:

    - Big cleaning and daily cleaning are two different concepts: According to most of the users, the big cleaning and the daily cleaning activities are two different concepts. While the big cleaning refers to cleaning the entire house with the vacuum cleaner and the help of supportive cleaning liquids and materials, the daily cleaning mostly includes the cleaning of the general living areas, such as living room, kitchen and restrooms with the help of vacuum cleaner only. The frequency of the big cleaning is mostly twice a month and the average duration of vacuum cleaner usage is 45 minutes. The frequency of the daily cleaning is mostly three times a week and the average duration of vacuum cleaner usage is 15 minutes.
    - Pets and children affect the frequency of the cleaning: Users who live with a pet or a pet and a child together tend to clean the general living areas such as kitchen, living room and the restrooms almost every day in order to clean the pet hair. The everyday cleaning for 10-15 minutes is mostly done by only using the vacuum cleaner. Users mentioned that a cordless vacuum cleaner is a must to have device for this kind of a cleaning, since it is not bulky as a canister.

- Product perception and purchasing decisions: Consumers generally have both rational and emotional motivations and purposes for having cordless stick vacuum cleaner. The rational motivations of the cordless vacuum cleaners generally come from its practicality and portability; it is reducing effort in a sufficient way, the emotional motivations come from the idea of seeing as a helper for consumer in daily routine against the whole duties and deriving order and cleaning in a practical way. But it has been deducted a perceptual hazard that cordless vacuum cleaner could not fulfill the cleaning process as effective as conventional vacuum cleaners. This perception derived from the weak suction power of some models, for changing this thought; the communication of high suction power of new developed stick vacuum cleaner should construct in effective way. Consumers generally choose and purchase their vacuum cleaners according to;
    - Suction power, performance and basic features
    - Premium and technological design
    - Ergonomics, usability and compatibility

    - Innovational or distinctive features among the competition
    - Visible and easy to clean dust bin
    - Using as a handheld vacuum cleaner
    - Adjustable tube
    - Brand recognition
- Vacuum cleaner preferences and pain points: The main motivations and common pain points of the vacuum cleaner type preferences of the users indicate that the areas of usage of different types of vacuum cleaners varies due to their functionality, size, power, storage, cleaning and etc. The storage, weight, battery life, dock station of the stick vacuum cleaners are the most important pain points. Most common findings are listed below:
    - Users who live in small apartments (30-45 m2), have difficulties to place the dock station in their apartments. They would prefer to be able to store their vacuum cleaner in a closet.
    - Users have difficulties to use the stick vacuum cleaner for a long time due to its weight. It causes arm, wrist and back pains.
    - The short battery life of the cordless stick vacuum cleaners makes the operation hard to use them for big cleanings.
    - Users have some concerns on using the stick vacuum cleaner for every flooring type in their houses. Some of the users mentioned that it leaves traces on tiles.
    - User have some concerns on the steadiness of the dock station. The vacuum cleaners may fall from the dock station, if it is not plugged properly.
    - Users complain about their cordless stick vacuum cleaners for not being able to vacuum backwards, which makes difficult to clean efficiently.
    - Users have some difficulties to empty the dust bin completely, since they need to touch the dirt in order to clean the dust bin.
    - Users complain about their stick vacuum cleaners for not being nice looking, since they need to store it on their living rooms with the dock station in order to plug it in.
    - Some of the users complain about the loud sound of the vacuum cleaner.

- Storage preferences: The type of the users' houses and the type/ the brand of their vacuum cleaners affect the way how users store their devices. The common behaviors of the users regarding the storage are listed below:
    - Most of the users are positive about storing the vacuum cleaner in the closet so that they do not need to see the cleaner all the time. They concerned about the visual appearance of the vacuum cleaner.
    - Some of the users complained about not being able to store their vacuum cleaner in a closet due to its big size. Users complain about their stick vacuum cleaners for not being nice looking, since they need to store it on their living rooms with the dock station in order to plug it in.
    - Some of the users prefer to place the vacuum cleaner on the corners of their living rooms or near the edge of the sofa which has poor visibility.
    - Some of the users expect the stick vacuum cleaner and the dock station to be nice looking and attractive, since they need to store it mostly in their living rooms. The visual attractiveness affects the placement of the device in the houses.
- User experiences and remarks about new developed stick vacuum cleaner: According to usability there have been deducted some high priority findings from consumer approaches separated into positive findings could be seen in Table 2.1 and features that requires improvements that. The findings could be taken into consideration as; positive findings to be highlighted in communication of the products, and improvements to reach better product and solutions and as potential features for using in communication.

Table 2.2: Positive findings about the new developed stick vacuum cleaner.

Aesthetic look: The cordless stick vacuum cleaner users mentioned that the device has a stylish and contemporary look and feel through its general form and black - gray colors. Some of the users mentioned that the color black demonstrates the vacuum cleaner more durable, powerful and timeless.
Suction power: Users are satisfied with the suction power of the vacuum cleaner, especially in the turbo mode.
Vertical parking: Users liked the vertical parking feature and mentioned that it is very useful and helpful. Most of the users mentioned the vertical parking feature is the feature that they liked most on their overall evaluation.
Illumination in brush: Users liked the LED light feature, since it would help them to see the dust on the dark areas and see the dust on the floor more detailed.
Crevice tool: Users evaluated the crevice tool as one of the most useful accessories of the vacuum cleaner.

Besides the positive findings, required improvement to enhance product features before the launch and make roadmap about the product development and mass production phase have been listed below;

- Weight: Users would position the vacuum cleaner only for using on daily basis, since it is too heavy that can cause arm, back and wrist pain, when it is used more than 5-10 minutes.
- Foldable tube: The foldable tube has been found most useful feature but users were not able to intuitively find the way to activate the tube. Most of the users assumed the two-neon yellow colored joint points in the middle of the tube as the buttons to fold the tube, which caused them to fail to fold the tube.
- Dock Station: Users tend to pick up the vacuum cleaner from the dock station using their one hands, which causes the station to fall down or swing. Users need to double check, if they are able to be plugged the device to the station properly to be charged due to the lack of visible indicators.
- Colors: Although, users liked the dark (gray & black) colors of the vacuum cleaner which gives a more durable impression and

attractiveness, they did not like the supportive yellow neon colors, which does not match with the overall color choice of the device and has a semantic meaning that can be misunderstood.

- Dust bin: Users used the yellow button or the gap between the battery and the dust bin in order to open the dust bin. In some cases, users opened the dust bin mistakenly while they are vacuuming.
- Complexity: Users mentioned that the vacuum cleaner has so much features (vertical parking, LED Light, foldable tube, brushes, etc.) that they should always be thinking about when and how to activate which feature during the cleaning, which suggests a complicated experience.

2.6 Improvements Through User Insights

- Weight: The main reason for weight feedback in the cordless vacuum cleaner is the motor and battery, which should exist inside the main body. In order not to sacrifice powerful suction and runtime, the product should contain 8 pcs battery cells and BLDC (brushless direct current) motor. The weight of cells and BLDC motor are almost the same as competitors and could not be changed. In specific to this feature, there will not be any improvement because of technical concerns.
- Foldable tube: The foldable tube could be bend/fold through two alternative buttons, which are located upper and middle side of the tube. The upper button is more functional to bend the tube while cleaning operation. So, to direct consumers for using the upper button, middle neon yellow joints have been revised as black to overcome the wrong direction for the folding feature.
- Dock Station: To make dock station more stable when the user picks up/place the vacuum cleaner, the gravity center of the docking station has been changed, and also unique locking mechanism has been designed and added between the tube& charging part and tube&base for enhancing stability.
- Colors: Users like the general robust effect of grey color, but they did not like the supportive yellow neon colors, which has a semantic meaning that can be misunderstood. Therefore, it has been decided that a separate color study should be triggered to create a correct perception of the product.

- Dust bin: The color of the dustbin release button between the battery and dustbin is changed from neon yellow to black. Through this change, it has been assumed that users will understand how to open and how to remove the dustbin after the initial experience.
- Complexity: Users thought that cordless vacuum cleaner has many dominant features, and they could not decide how and when they use the correct feature; to eliminate this perception, color, and serigraphy study should conduct an effective way that guides users properly.

According to these iterations, improvements, and overall studies, final revisions have been conducted to reach final design output and begin preparation for communication materials. The conducted revision could be categorized as below;

- technology naming study to emphasize outstanding features
- serigraphy application to highlight important features and guide users for proper actions according to the decided technology names
- a color study for each brand (Arçelik, Beko, Grundig) separately according to their target markets.

According to decided main features of the product, technology and product name alternatives have been generated through prominent features (suction power, vertical parking, foldable tube) in analysis and report of the UX tests. The generated alternatives could be seen in Table 2.3, and the chosen names have shown as bold.

Table 2.3: Technology and product name alternatives.

Foldable Tube Feature Name Alternatives	ErgoFold FlexyMax FlexyWay **ActiFlex** ActiForm	ShapeShifter SupErgo SupraFlex EasyFlex ReachOver
Vertical Parking Feature Name Alternatives	EverUp GoUp **SelfStand** StandUp UpForm	UpLift UpSelf StandReady AntiDrop AntiFall
Product Name Alternatives	RocketClean PowerStick **PowerClean**	

After the chosen technology names and product name, color, and serigraphy studies have been requested from the Industrial Product Design team according to given specifications. While the color study has been requested for three brands separately, one common serigraphy study has been requested with just language differentiation for all brands.

2.7 Creating Technology Framework According to UX Test Result

As mentioned before, according to Krippendorff and Butter, through product semantics and communication, designers have the power to demystify complex technologies into consumers' life and improve the interaction between artifact and users (1984) [15]. In parallel with this point of view, Demirbilek and Sener stated that product semantics as an effort for defining convenient visual/physical messages or clues and integrating these messages or clues into product features. If the value creation and semantic approach is properly applied into NPD phases, product features could be more understandable and acceptable from users in both emotional and cognitive levels; and through these semantic features, designers and companies are improving possibility of easy recognition, connection and adaption between products and potential users (2001) [2]. By taking into account, these approaches, for creating the framework of important values and features of new generated products, the main

and distinctive benefits of the product have been expounded through UX test results to create a structure for design stories. According to Terninko's differentiation strategy, for creating rich emotions and experiences designers/developers should use three types of features that; basic features, to correspond the basic needs of potential users; performance feature, to distinguish from competing products in market, and excitement features that consumer does not think to encounter in the product and would be pleased when features occur by means of innovation (1995) [13]. So, for achieving potential users, narratives and technology frameworks should consisted and gave clues about from basic, performance, and excitement features of the generated product. From these approach, according to analyzed UX tests and overall developments, the final specification of the product could be summarized as;

- Basic and performance features:
    - Effective cleaning with 165 W suction power for both daily cleaning & detailed cleaning: Thanks to high suction power of PerformCyclone™ technology, consumer could be clean their living spaces even deep into the carpet, hard floors and even hard-to-reach spots. The cyclonic system of technology offers constant and high suction power so that even the smallest particles of dust get hoovered up off floors.
    - Up to 45 minutes operating time with removable li-ion 28.8 V battery: The 28.8V li-ion battery can full charge in about 4-4.5 hours, and can up to 45 minutes at a time, giving you the time you need to clean your whole house or apartment in one go. The batteries are removable, which means you can set fully charged batteries aside while using the vacuum and switch them in when needed for uninterrupted cleaning.
    - Adjustable speed settings from handle.
    - 0.9 L dust bin: The transparent and high-volume dust bin offers consumer longer operation because they do not have to clean/empty their dust bin repetitively while one cleaning session.
    - HEPA 10 filter: The special filter makes sure that even the smallest particles of dust aren't released back into the air of your home, a particularly important feature for people with allergies.

- Accessories: The product includes special accessories for using vacuum cleaner as a handheld cleaner while removing tube and placing accessories to use for removing dust of furniture etc.

- Excitement features:
  - ActiFlex: PowerClean cordless vacuum cleaner has an innovative foldable tube, which folds at single push of a button. In ergonomic manner that means user don't need to bend over to get those impossible-to-reach spots under the furniture.
  - SelfStand: Consumer could park the product upright thanks to its special lock mechanism on the main brush. This lets users pick up their product instantly with single locking gesture, wherever they want without bending down or supporting. It is a safe and useful way of cleaning especially in urgent cases such as ringing bells/phones, crying babies etc.
  - Illuminated brush: Through its special main brush, user could see and clean easily dust and dirt in dark and/or nook spots.
  - Storage solutions: Through its special design and docking/charging station which could be use mobile or wall-mounted, the vacuum cleaner does not need to any cabinet or area to put it away.

2.8 Final Design Output

According to different strategies and targets of the Arçelik, Beko and Grundig brands, the generated color and serigraphy studies and final design could be seen in Figure 2.10, Figure 2.11, and Figure 2.12.

Figure 2.10: Final design output for Arçelik brand.

Figure 2.11: Final design output for Beko brand.

Figure 2.12: Final design output for Grundig brand.

3. PRODUCT NARRATIVES THROUGH CONSUMER INSIGHTS

According to studies conducted and developed up to this phase, in this phase, design story proposal has been constituted through mainly UX tests results to reach potential users, but also while considering product features and brand strategies. According to Bevan, user experience tests and output insights could be used for enhancing user contentment with achieving both functional and hedonic goals (2009) [21]. Hedonic goals important for experience and final design because user emotions and perception could give clues about attitudes that 'how' users interact with the product, and they could be seen as resources for understanding about 'what' users demand. According to Iannilli et al., while producing a narrative of these user demands and experiences, layers of meaning for objects or products; companies could be generated multiple stories for brands and users via different relationship with the subject and object, and by way of different features of the object (2015) [43]. To generate different narrations, in related with UX, features, and needs should be explained but also should have placed them into a real context, to spark new communication ideas and enhance collaboration and innovation, to show thoughts and create shared experiences, to recognize the approaches and to convince user for value creation (Quesenbery and Brooks, 2010) [50].

In parallel with this framework, Stickdorn and Schneider mentioned about storytelling approaches accordingly Pruitt and Adlin's framework which consist eight primary indices for creating compelling user stories; goal, persona, related characters, situation before the story begins, goal of the main object, stimulation for the action, context of the story and outcomes of the story (2006) [52]. So, to construct binding between product, brand, and potential user, UX outputs, and consumer insights valuable inputs for creating marketing narratives for consumer products, they could be seen effective manner for presenting new designed products/services in a proper way while understanding user needs and emotions.

3.1 Brand Strategies

For creating compelling stories about design products, it will be inevitable to construct product stories according to general decisions and strategies of brands for reaching the target market more efficiently. To narrate highlighted features of products for consumer stories, brands generally show these features with the framework that consist, user, user benefit and the usage scenario between subject and object, product and user in symbolic, physical and psychological dimensions of these features in relation with the brand values and strategies (Aaker, 1991; Keller, 1993) [48], [49]. As mentioned before, in the scope of this study, the new developed cordless vacuum cleaner has been narrated for three brands (Arçelik, Beko, and Grundig) of Arçelik company separately, through their different target markets, regions and potential user profiles. Therefore, approaches and strategies of three mentioned brands have been expounded to specify aims and targets for the narration phase.

- Arçelik: The primary motivation and strategy of Arçelik brand is developing and producing innovational products within the cultural context for reaching a wide range of user segments through the claim of Turkey's Lovemark with the most reliable and most common service and sales network in Turkey.
- Beko: The primary standpoint of Beko brand is providing convenience and a healthy way of living to create a better and easier everyday life through the brand motto 'Live like a Pro'. Beko brand competing and serving only product and user-centric functional and visual needs such as cleaning well, cooking well, looking well through two communication drivers: technology and design. The general theme of the stories behind the Beko brand are stories of human discoveries, determined by real needs and real insights solving real problems, so users have more time to do things they love.
- Grundig: Grundig offers high-quality, modern, and premium products that designed to realize value-added experiences in user life. The primary motivation and claim are enhancing the everyday life of people much easier and better in a reliable and sustainable way with the high segment product, design, and material solutions.

3.2 Target Persona

According to brand strategies and consumer insights, there has been decided three separate personas for each brand to generate and fictionalize narrations through determined personas and related indices.

- Arçelik: The representative persona of target user population of Arçelik brand could be described as; 40 years-old married women with children living in Turkey, who care about constant cleaning of their living spaces to be sure about her family's health, wellness and happiness, and also care about create time for herself and her family in the remaining hours apart from housework in a day.
- Beko: The representative persona of the target user population of the Beko brand could be described as; 28 years-old single woman who lives with her dog in a small studio apartment in Germany. She works long hours and enjoys spending time with her friends, so she could not make enough time for cleaning or other housework. Therefore, she prefers practical, functional, and well-designed products to overcome house cleaning easy and effective way.
- Grundig: The representative persona of the target user population of Grundig brand could be described as; 35 years-old married couple with no children and high income, who would like the buy and prefer high quality and well-design products and solutions, and living in the United Kingdom.

3.3 Generating Narratives for Each Brand

According to determined personas, the product narratives has been generated through examined literature and consumer insight output to provide and create accurate commination proposal for a product-consumer relationship. By way of Pruitt and Adlin's storytelling approaches (2006) [52], three separate narrative proposal has been constructed for each brand as an output of complete literature examination, NPD, and UX processes. In the scope of this study, it is essential to remark that there has been creating the framework of the story through narrative proposal according to highlighting the deducted consumer insights and product features, there has not been created any marketing/communication materials of these narrations, narrative proposal will be presented to the marketing teams as an output of study.

3.3.1 Narrative proposal for Arçelik

In the frame of Pruitt and Adlin's storytelling approaches (2006) [52]., in the light of deducted consumer insights research and brand strategy, the narrative indices could be categorized as;

- Goal: to reach potential cordless vacuum cleaner consumers in Turkey while stimulating target user interest.
- Persona: 40 years-old married women with children living in Turkey, who care about constant cleaning of their living spaces to be sure about her family's health, wellness and happiness, and also care about create time for herself and her family in the remaining hours apart from housework in a day.
- Other characters: Two children on the background, peaceful living room, PowerClean cordless stick vacuum cleaner with the specially chosen purple and orange colors for Arçelik brand in scope of Turkey market.
- Situation before the story begins: Dirty/dusty floor or carpet.
- Goal of the main object: To be the helper of the main character while dealing with dust and dirt and clean the floors/carpet in a practical way.
- Stimulation for the action: The motivation is reaching clean, quiet and comfortable living spaces, and spend quality time with family.
- Context of the story: Living room of a family within the concept of modern Turkish home. The vacuum cleaner should take part besides the women as if a helper and/or assistant of her.
- Outcomes of the story: To trigger and convince consumer interest for gaining cordless vacuum cleaner instead of conventional vacuum cleaners in Turkey.

3.3.2 Narrative proposal for Beko

In the light of deducted consumer insights research and brand strategy, the narrative indices for Beko brand could be categorized as;

- Goal: to reach potential cordless vacuum cleaner consumers in Europe while stimulating target user interest.
- Persona: 28 years-old single woman who lives with her dog in a small studio apartment in Germany. She works long hours and enjoys spending time with

her friends, so she could not make enough time for cleaning or other housework. Therefore, she prefers practical, functional, and well-designed products to overcome house cleaning easy and effective way.

- Other characters: A dog on the background, small studio apartment, PowerClean cordless stick vacuum cleaner with the specially chosen dark green and neon yellow colors for Beko brand in the scope of Europe market.
- Situation before the story begins: Dirty floor and carpet full of pet hair.
- Goal of the main object: Clean the floors/carpet/furniture in easy and practical way.
- Stimulation for the action: To create clean and healthy living space to gain time for doing things that she loves.
- Context of the story: Living room of modern small studio apartment with an open kitchen, the cordless vacuum cleaner stand on the back like as a decoration of the apartment.
- Outcomes of the story: To trigger and convince consumer interest who wants to live healthy and innovational way.

3.3.3 Narrative proposal for Grundig

In the light of deducted consumer insights research and brand strategy, the narrative indices for Grundig brand could be categorized as;

- Goal: to reach potential cordless vacuum cleaner consumers in Europe while stimulating target user interest.
- Persona: 35 years-old married couple with no children and high income, who would like the buy and prefer high quality and premium products and solutions, and living in the United Kingdom.
- Other characters: A contemporary big house with modern decoration, PowerClean cordless stick vacuum cleaner with the specially chosen metallic dark grey color for Grundig brand in the scope of Europe market positioned above the Beko brand.
- Situation before the story begins: Dirty floors

- Goal of the main object: Clean the dirty floor in effective and technological way.
- Stimulation for the action: to create clean and sparkling living space in a reliable and sustainable way.
- Context of the story: Within the modern living room with huge windows that opens a garden full of trees and flowers; the women meditate and the man reading a book while sitting in the modern sofa, the cordless vacuum cleaner stand on the hallway as an essential and functional appliance of the house.
- Outcomes of the story: To trigger and convince consumer interest who wants to live well, sustainable, and premium.

In conclusion, marketing narratives could be seen as a way to remark consumer needs and demands for drawing attention, and as a mediator between products, brands, consumer, and marketing processes. The narrative proposal generates the basis for marketing materials, which is the final output of marketing processes, and the proposal could be used as a base for all kinds of material such as image, banner, poster, video, etc.

4. CONCLUSION

In this study, it has been analyzed and described an ideal design briefing, product development, and product communication processes through the aim of to examine, approaches, methods, and strategies behind and beyond through new product development process, to generate and present value-added products and features to potential consumers; and also integrate user experience research to new product development process and the basis of marketing materials in scope of Arçelik company throughout a sample project. According to initial literature research and observations in the scope of the company, it has analyzed a gap between the consumer insights, new product development process, and marketing materials of the everyday products that generated by companies. The disconnection of the mentioned processes tried to be resolved through the contribution and integration of user-centered design, semantic and narrative approaches into new product development and the basis of marketing processes within the frame of design education and knowledge. According to this context and scope, some main aspects and questions will be handled to understand the thoughts and strategies of consumers and companies, and the overall study has been conducted from related literature review with the main research question and sub-questions.

In the literature review section, four main fields have been researched and presented, which are user-centered and emotional design, product semantics, user experience (UX), and narrative approaches in product development and marketing processes. After the literature view section, an ideal product development process has been described from beginning to end in the scope of a chosen product line, and through supporting with presented literature, a UX testing has been generated and analyzed for gaining and evaluating consumer approaches, needs, and remarks about the new developed product. According to the generated UX test, final design output and technology framework have been constructed to create a basis for the narrative process. After the analyzes of product development, evaluation, and improvement process, through the outputs of the NPD and UX testing processes, the brand strategies,

personas, and narrative proposal have been conducted. It has been clearly seen that user research are crucial applications and mediators, for realizing and creating user-centered, innovative and value-added products, listening and deducting what users demands; and to integrate this deducted knowledge into product development process, create value-added concepts and conveying these features to potential user while using suitable product and marketing narratives. In this study, the main output shown in Figure 4.1, can be conceptualized as product narratives that based on main inputs which are consumer insight and user experience studies.

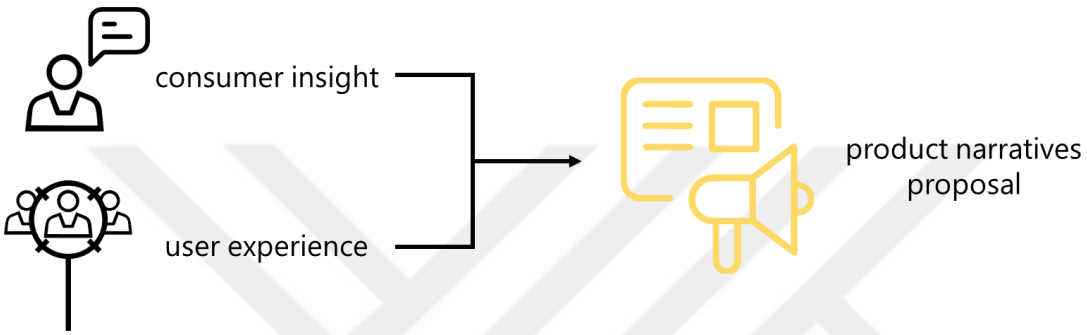

Figure 4.1: Main inputs and output of the study.

As a conclusion, for creating user-centered, functional, innovative, and memorable products, it is important to know clearly what potential users demand through effective user research and consumer insight studies. Besides, to enhance NPD process; companies or organizations need to conduct their projects with multi-disciplinary teams throughout contribution and integration of design knowledge in several phases of projects such as concept creation, design briefing, product design and development and also product communication phases; because NPD process should consist of innovation, insights, creativity, design and clear communications to produce new well-designed and user-centered products.

4.1 Further Studies

In this study, overall research, analyzes, developments, and UX tests concluded with narrative proposals according to the deducted consumer insights as an output. These narrative proposals for each brand should be used as a framework for marketing materials to present and reach potential users. Correspondingly, for testing and analyzing the effect of these development and story generation process after the product launch on target markets, there should be a further study for testing if features

reach or do not reach to the target and potential user through integration of consumer insight into narration approach.

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APPENDICES

APPENDIX A: The first page of the University-Industry Collaboration Program Agreement.

APPENDIX A

ENDÜSTRİDE UYGULAMA DESTEKLİ TEZ PROGRAMI

UYGULAMA SÖZLEŞMESİ

1. TARAFLAR

1.1 ARÇELİK A.Ş.

Tuzla, 34950 İstanbul

ARÇELİK olarak anılacak

1.2. Danışman, DANIŞMAN olarak anılacaktır.

2. SÖZLEŞMENİN KONUSU

2.1 ARÇELİK ile DANIŞMAN arasında imzalanan ”Endüstride Uygulama Destekli Tez Programı Çerçeve Sözleşmesi” ndeki şartlar çerçevesinde, ARÇELİK’ in Ar-Ge kapsamına giren TASARIM BİLGİSİ İLE YENİ ÜRÜN GELİŞTİRME SÜRECİNDE ÜRÜN ANLATILARI OLUŞTURMA: ARÇELİK ŞİRKETİ’NDE YENİ KABLOSUZ ÇUBUK SÜPÜRGE ÜRÜNÜNÜN HİKAYESİ projesi konusunda, aşağıda ismi belirtilen İTÜ Öğretim üyesi (PROJE DANIŞMANI) danışmanlığında, gene aşağıda ismi belirtilen İTÜ Öğrencisinin (PROJE GÖREVLİSİ) yapacağı bitirme ödevi/tezinin yukarıda belirtilen Ar-Ge projesi temelinde yaptırılmasını düzenleyen bir uygulama sözleşmesidir.

PROJE DANIŞMANI

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Figure A1: The first page of the University-Industry Collaboration Program Agreement.

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