THE ROLE OF HUMAN-CENTERED DESIGNER IN A MULTINATIONAL COMPANY THROUGH INNOVATIVE PRODUCT DEVELOPMENT FOR AFRICAN BOP COMMUNITIES

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ABSTRACT

THE ROLE OF HUMAN-CENTERED DESIGNER IN A MULTINATIONAL COMPANY THROUGH INNOVATIVE PRODUCT DEVELOPMENT FOR AFRICAN BOP COMMUNITIES

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The importance of the field of design is increasing in the face of complex problems humanity has been facing. Respectively, the orientation of design is shifting from products to strategies that facilitate corporate transformation. In parallel with this transformation, designers take new and diverse roles. However, there is a knowledge gap regarding these roles. This study aims to explore the roles the designer (author) takes in a multinational home appliances company through the innovative product development for the African Bottom/Base-of-the-Pyramid (BoP) communities. Its goal is to propose a model built on research data. The research methodology comprises the designer's auto-ethnographic inquiry of long-term practice-led research within the new product development case and its analysis with grounded theory. The results show that the designer plays six diverse and contemporary roles throughout the new product development process. These are frame creator, user-researcher, collaboration mediator, creative facilitator, evaluator, and inspirer. Besides, human-centeredness, holistic thinking, change-driven mentality, collaborative mentality, tenacity, and systems thinking emerge as prominent skills. The results and the outcoming model indicate that the designer spreads skills to the entire organization that makes organizational learning possible. The significance of this research comes from shedding light on the contemporary designer roles in the context of innovative product development for a complex problem.

Keywords: Contemporary designer roles, design for the bottom/base-of-the-pyramid, design thinking, human-centered design, new product development.

ÖZ

AFRİKANIN DÜŞÜK GELİRLİ TOPLULUKLARI İÇİN YENİLİKÇİ ÜRÜN GELİŞTİRME SÜRECİNDE ÇOKULUSLU BİR ŞİRKETTEKİ İNSAN-ODAKLI TASARIMCININ ROLÜ

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Karmaşık dünya problemlerin çözümünde tasarım alanının önemi gün geçtikçe artmaktadır. Tasarım, ürün odağının ötesine geçerek, endüstrinin olumlu değerler çevresinde şekillenmesine yardımcı olan bir alana dönüşmektedir. Bu dönüşümün paralelinde, tasarımcılar pek çok farklı yeni rol üstlenmektedir. Ancak henüz gelişmekte olan bu rollere dair bir bilgi boşluğu bulunmaktadır. Bu çalışmanın amacı tasarımcının (yazarın) çokuluslu bir beyaz eşya şirketinde, Afrika'nın düşük gelirli toplulukları için yenilikçi ürün geliştirme sürecinde aldığı rolleri araştırmak olup, çalışmanın hedefi ise, tasarımcının aldığı farklı rollerin organizasyona katkısını tarif eden bir model önermektir. Çalışma yöntemi, ürün geliştirme vakasında yer alan tasarımcının uygulamalı araştırması sırasında, oto-etnografi yöntemiyle tuttuğu günlüklerin, yapılandırılmış kuram çerçevesinde incelenmesine dayanmaktadır. Çalışma ile, tasarımcının çerçeve geliştiricisi, kullanıcı araştırmacısı, iş birliği arabulucusu, yaratıcı çalıştay tasarımcısı, ürün değerlendiricisi ve ilham verici olmak üzere altı rol üstlendiği görülmüştür. Ayrıca, insan odaklılık, bütüncül düşünce, değişim odaklılık, işbirlikçilik, zorluklar karşısındaki azim ve sistem düşüncesinin ön plana çıkan düşünce yapıları ve yetenekleri olduğu görülmüştür. Çalışmanın sonuçları ve model göstermektedir ki tasarımcı aldığı farklı roller aracılığıyla becerilerini organizasyona yaymakta, bu şekilde kurumsal öğrenme mümkün olmaktadır. Bu

çalışmanın önemi, tasarımcının zor bir problem için yenilikçi ürün geliştirme süreci bağlamındaki güncel rollerine ışık tutmasından gelmektedir.

Anahtar Kelimeler: İnsan-odaklı tasarım, piramidin altı/tabanı için tasarım, tasarımcıların güncel rolleri, tasarım-odaklı düşünme, yeni ürün geliştirme.

To my family

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LIST OF ABBREVIATIONS

ABBREVIATIONS

BoP	Bottom/Base-of-the-Pyramid
DIY	Do-It-Yourself
DT	Design Thinking
FGD	Focus Group Discussion
GDP	Gross Domestic Product
GT	Grounded Theory
HCD	Human-centered Design
ICSID	International Council of Societies of Industrial Design
IPR	Intellectual Property Rights
MDG	The Millennium Development Goal
MNC	Multinational Corporation
NGO	Non-Governmental Organization
NPD	New Product Development
PEP	Product Engineering/Emergence Process
POV	Point-of-View
PPP	Purchasing Power Parity
PSS	Product Service System
R&D	Research and Development
SDG	Sustainable Development Goals
SSA	Sub-Saharan Africa
UX	User Experience
UNDP	United Nations Development Programme
WDO	World Design Organization
WS	Workshop

CHAPTER 1

INTRODUCTION

1.1. Problem Background

Living under equal conditions is the right of all humans. However, the level of development across the world differs. Although fair conditions for all is the ultimate aim of humanity, still at least 736 million of the world's 7.7 billion population live under $1.25 a day (World Bank, 2018, p. 1). These communities, known as the Bottom/Base-of-the-Pyramid (BoP), are economically vulnerable, lacking social power, or have limited access to critical sources such as clean water and constant electricity (United Nations Development Programme, 1995; Prahalad and Hammond, 2002; Kandachar, 2012; World Bank, 2018, pp. 5-6).

Many actors play a role in poverty eradication. Among the attempts directed towards the BoP communities, the delivery of design solutions happens to be both a fundamental aim and responsibility, considering design's transformative potential for people with *real needs* (Papanek, 1971).

A growing number of multinational companies also have been involved in the challenge on the call of Prahalad and Hart (2002). A concrete strategy is yet to exist; companies are in search of methods on their way to meet the unsolved needs of BoP communities.

The challenge awaits creative and novel solutions where the perspectives of industrial design can contribute significantly. Designing innovative products for the underserved people is a starting point. However, it is an ineffective effort unless an in-depth analysis of real needs is made, and the solutions are tailored for people responsibly. Regarding this, *human-centeredness*, which takes roots from gaining empathy with people, attains an essential place by putting the needs of people at the core of design processes (Brown and Wyatt, 2010; IDEO, 2015).

Nevertheless, the subject is surrounded by various social, political, environmental, and technical challenges (United Nations Development Programme, 2014). The actors not only have to come up with novel solutions through a human-centered process but also overcome the barriers enclosing the problem domain. In this context, the role of *design thinking* gains significance both in the product development process and during the resolution of the challenges that actors face (Brown and Wyatt, 2010).

This brings us to the multifaceted nature of design and its contemporary definitions. Design has been experiencing a transition from being an act of designing products, to a practice of designing on a larger scale for complex societal problems. With this transition, designers are becoming *design thinkers* who apply their knowledge and skills for the solution of diverse issues (Sanders and Stappers, 2008; Borja de Mozota, 2010; Muratovski, 2015; Kramer, Agogino and Roschuni, 2016). In line with this, the skills of the human-centered designers hold a potential to benefit the endeavors towards eradication of poverty.

1.2. Aim and Goal of the Research

Being both a practitioner and a researcher who is motivated to contribute to the solution of the world's complex problems, I joined the new product development team of BSH Home Appliances company in Istanbul as a UX Researcher and an industrial design Ph.D. student. For two and a half years, between February 2016 and August 2018, I worked at the Innovation and Technology Management department and supported the Corporate Innovation department in Germany for a *unique* BoP product development project.

In this duration, I was involved in the disruptive innovation project for leveraging the quality of life of African BoP communities. Being the first industrial design Ph.D. student of the department, I embarked on a human-centered design journey with the very question of how I can contribute to the quality of life of the communities living in a distant region under poverty and conflict. I got familiar

with African BoP communities and applied my designerly knowledge and skills to benefit the product development process in a human-centered way.

> "I have been learning a lot about users from the moment I began to work with Hande. Thanks to working with her, I feel empowered about embracing the challenges of designing for the African communities." (G. D. A., personal communication, June 30, 2016)

The words of the project leader made me think that I was influential to the practices of the team. As I was feeling more and more empowered through the process, my impact on the team and the team's impact on the organization was also increasing (See Price, Wrigley and Matthews, 2018). My values, background in industrial engineering, sociology, and industrial design, and relevant mindsets/skills were useful across the roles I was able to take throughout the product development process and collaborations. In this duration, I happened to experience the design as a process at the intersection of all the discussion about the roles of designers in the contemporary world (See Sanders and Stappers, 2008; Borja de Mozota, 2010; Muratovski, 2015; Na, Choi and Harrison, 2017; Price et al., 2018).

Upon this reflection, I realized that this unique and emergent BoP product development process that involved me as a human-centered designer, was worth examining because it contained valuable information for researching the process and resources that shaped a product for the BoP communities.

On these grounds, the aim of this dissertation is the long-term exploration of the contribution of the designer by disclosing the roles through the corporate product development for BoP communities. Moreover, the goal of this dissertation is to deliver a model on the contributions of the designer, informed by the practice and literature (Figure 1).

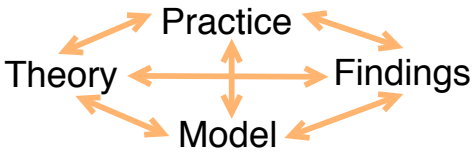

Figure 1. The goal of the research.

1.3. Research Questions

In this research, I aim to explore the contribution of designer to the process of BoP product development. With this purpose, I have two main research questions. The first research question and four sub-questions aim to understand the context of BoP product development with why, what, and how questions. They probe the past experiences due to adopting a retrospective approach. First research question and its sub-questions are as follows:

1. How did the new product development process targeting BoP communities take place?

1.1. Why/with which motivations did the new product development for the BoP communities take place?

1.2. What approaches, methods, tools were available during the product development?

1.3. How did the new product development process adapt to the BoP product development?

1.4. What challenges and opportunities emerged through the course of the BoP product development?

While the first question aims to understand the context of research, the second research question and its four sub-questions aim at answering how I contributed to the process of BoP product development. The questions are:

2. How did the designer contribute to the new product development process?

2.1. How did the roles and responsibilities take shape?

2.2. Which roles did the designer take?

2.3. What types of resources (skills, methods, tools, research and collaboration channels) did the designer benefit from?

2.4. Which of the designer's skills influenced the product development process, and how?

1.4. Scope

Despite the great number of approaches around an ideal BoP vision, research about the roles and skills that make it possible to learn and apply the vision has been lacking. Aimed at researching the roles and skills that benefit the BoP product development of a company, this research adopts the perspectives in three literature domains: BoP, NPD, and design (Figure 2).

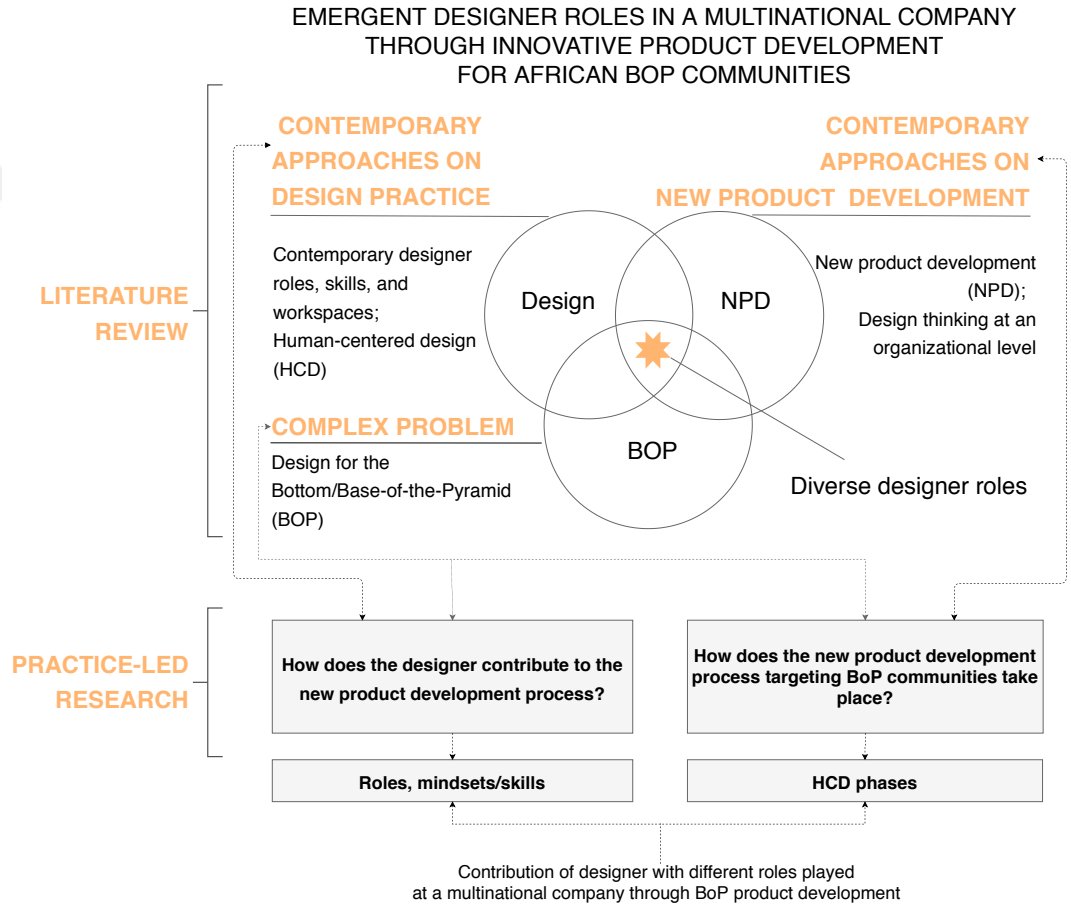

Figure 2. The context of the research.

In this regard, this research follows the steps below:

1. Exploration of the new product development phases, collaboration channels, data access channels, and the complexities and opportunities within the design process.
2. Autoethnographic research on my own design practice throughout the BoP product development process of the multinational company.

3. Interpretation of the designer role in the product development process regarding the approaches, mindsets, and skills applied.
4. Presenting a model of the role of the designer in the product development process of the multinational company, built on research data.

1.4.1. New Product Development Phases, Collaboration Channels, Data Access Channels, Complexities and Opportunities

Seeing advantages of carrying out an inquiry in an in-depth way and within the real context (Yin, 2009), I entered into the world of a corporate organization. Through the process of becoming an "insider" to this organization, I was able to observe the characteristics of the new product development (NPD) project for BoP. I participated in eight *embedded* cases (Yin, 2009), of which two of them were new product development, and the remaining six were the collaborations accompanying the NPD project. Through participant observation and by taking expert opinions, I revealed the phases of NPD, collaborating actors, and data channels. This way, I was able to familiarize with the BoP product development and recognize the challenges and opportunities in practice, such as applying human-centered design.

1.4.2. Design Practice Throughout the New Product Development Process

BoP approaches have been under transformation in the last two decades (Follman, 2012; Kolk et al., 2014; Dembek et al., 2019). Indeed, this transformation happens as a learning process for having an applicable vision for BoP (i.e., BoP 1.0, BoP 2.0, BoP, 3.0, BoP 4.0), so as the changing new product development (Manzini, 1993; Beckman and Barry, 2007; Loch and Kavadias, 2008; Jelen and Kamboj, 2010; Vasantha et al., 2011; Diehl and Christiaans, 2015; Na, Choi and Harrison, 2017) and design paradigms (WDOa, n.d.; WDOb, n.d.).

Knowledge becomes what is needed in order to guide this transformation. As Press and Cooper (2016, pp. 198-200) express, “new” designers are knowledge workers who can understand, apply, and create knowledge through practice. In line with this, I aimed to enter into the process of knowledge creation, especially into my own practice, as I was impactful in creating knowledge within the experimental product development of the company for BoP with my designerly ways of thinking and doing. In search of a research strategy that would give me the opportunity to embrace my own design practice, I decided to adopt autoethnographic research based on several advantages. Autoethnography offers a wider contextual understanding due to reflexive exploration of experiences and interactions (Pace, 2012). Moreover, its opportunities extend to the examination of a socially constructed process from the real context and in an informed way, and without losing nuances that might be lost in traditional approaches (Adams, Ellis and Jones, 2017).

1.4.3. Designer Role in the Product Development Process

Throughout the observation of and involvement in this socially constructed context, I came to realize that I was able to take several roles by applying my design skills. These roles and skills were in parallel with rising discussions concerning the contemporary roles and skills of designers (Inns, 2007; Sanders and Stappers, 2008; Tan, 2009; Borja de Mozota, 2010, 2011; Bohemia and Ghassan, 2011; Raijmakers et al., 2012; Diehl and Christiaans, 2015; IDEO, 2015; IDEO.org, 2015; Muratovski, 2015; Kramer et al., 2016; Press and Cooper, 2016; Price et al., 2018). I aimed to reveal these roles and skills and explain their implications for the BoP product development practice of the company.

1.4.4. Presenting the Model Built on Research Data

In an effort to explain the contribution of design/er to the BoP product development process, I applied the steps of grounded theory analysis to my autoethnographic inquiry (Pace, 2012). As an outcome of this process, I delivered

a model explaining the role of the designer in the context of BoP product development practice of the company.

In line with the literature that sees design to be impactful at different layers of organizations (Borja de Mozota, 2010, 2011; Muratovski, 2015; Na et al., 2017, Price et al., 2018), the outcoming model implies that the contribution of the designer is indeed at a wider organizational level. The model shows that the designer embraces complexity of the problem domain with experiential learning. The roles taken and the skills applied serve as the means for knowledge creation, accumulation and transfer. The designer's learning model transfers to the team, and ultimately to the entire organization with the roles taken and the skills applied.

1.5. Contribution to the Literature

This dissertation contributes to the literature by proposing a model that incorporates HCD phases, emergent designer roles, and associated mindsets/skills through corporate product development for the BoP. This model has a significant contribution to the literature on grounds of demonstrating a repertoire of emergent designer roles and skills that are likely to emerge at the intersection of BoP, NPD, and design.

The outcomes provide rich and in-depth knowledge source primarily for the corporate product development teams, learning to design products for the BoP communities, and secondarily, the collaboration partners for the BoP projects, being governmental and nongovernmental agencies, international institutions, startups, entrepreneurs, design consultancies, and universities, who collaborate with multinational companies on the BoP problem domain. Moreover, the findings of this research benefit academia and recruitment specialists aiming to cultivate resources for embracing complex problems such as designing for the BoP.

1.6. Structure of the Dissertation

The structure of the dissertation is presented in Table 1. This dissertation consists of six parts composed of a total of ten chapters, namely literature review (Chapters 2, 3 and 4), methodology (Chapter 5), findings (Chapters 6), discussion (Chapters 7 and 8), model (Chapter 9), and conclusion (Chapter 10).

Table 1. Structure of the dissertation.

Chapter	***Content***	***Aim***
Ch. 2	Literature Review	Exploring the approaches to contemporary designer roles
Ch. 3	Literature Review	Explaining the role of design in transforming NPD practice
Ch. 4	Literature Review	Explaining the role of design in transforming Bottom/Base of the Pyramid domain
Ch. 5	Methodology	Elaboration of the research methodology
Ch. 6	Findings	Presentation of the autoethnographic inquiry
Ch. 7	Discussion on NPD	Discussion of new product development process phases and peculiarities for BoP product development
Ch. 8	Discussion on HCD	Discussion of the roles and mindsets/skills
Ch. 9	Model	Introducing the model
Ch. 10	Conclusion	Discussing the outcomes and concluding the dissertation

- In an effort to answer the second research question and its sub-questions, Chapter 2 introduces the approaches in the literature regarding the emergent designer roles, skills, workstyles in the contemporary world. Then, it presents human-centered design approach by looking at its foundations and providing definitions of IDEO.
- In order to answer the first research question and its sub-question Q1.2., Chapter 3 reviews the fundamental elements of new product development process by referring to the NPD literature. Then, it explores design thinking as a transformative approach for NPD and presents experiential learning and organizational learning theories.
- To answer both research question and its sub-questions Q1.1., Q1.3., Q1.4., and Q2.3., Chapter 4 presents the multi-dimensional aspects of design for the bottom/base of the pyramid (BoP) literature through

presentation of the definitions on poverty, global efforts on poverty eradication, multi-stakeholder partnerships, business-driven efforts, and corporate responsibility projects. Afterward, it explores the approaches to BoP vision and shows the impact of design in the transformation of BoP product development.

- Chapter 5 explains the methodological approaches of this dissertation. Based on the components of quality research, it clarifies the methodology of this research. It respectively elaborates on the research paradigm, strategies, research methods, rhetoric, and position, ethics, and values of the researcher.
- Chapters 6 displays the findings of the autoethnographic inquiry. It narrates the experiences based on the order of observation. It employs a transparent narration style.
- To answer the first research question, Chapter 7 informs the product development process phases, methods, and tools and discusses their implications for BoP product development.
- To answer the second research question, Chapter 8 firstly summarizes the tasks of the designer. Then it informs about the roles, and mindsets/skills that emerged across cases and discuss their relevance to the literature.
- Chapter 9 introduces the model built on data of this research. After summary of the contextual characteristics, it introduces the model and its dimensions. Then, it provides explanations of the limitations of the model.
- Finally, Chapter 10 concludes the dissertation by reflecting back on the research questions. It explains the contributions of the research. It offers directions for future research and provides self-reflections.

CHAPTER 2

THE CHANGING SCOPE OF DESIGN AND DESIGNER ROLES

This chapter covers the approaches concerning the new designer roles in today's world. First, it explores the transformation in the definition of the design practice. Following, it presents the roles taken and skills applied by contemporary designers and depicts the workstyles. Then, it explains the emerging field of human-centered design. The chapter concludes with the significance of the contemporary roles and skills of designers in embracing complex problems of the world.

2.1. The Change in the Definitions of Industrial Design Profession and Industrial Designer

Examining the change in the definitions of the designer and design profession seems to be a necessary step in explaining the roles designers take in the contemporary world. From the early debates on the profession of design to the current date, the approaches have been evolving. The definitions are provided in Table 2.

Today, the goals of the industrial design profession go beyond products, and extends to address world problems with accessible, affordable, reliable, sustainable, and respectful solutions which balance 3P; people, planet and profit. In this respect, sustainable development goals (SDG) are endorsed among the topics that anticipate being addressed by industrial designers:

- SDG3: Good health and wellbeing.
- SDG6: Clean water and sanitation.
- SDG7: Affordable and clean energy.
- SDG9: Industry, innovation, and infrastructure.
- SDG11: Sustainable cities and communities.

- SDG12: Responsible consumption and production.
- SDG17: Partnership for the goals (WDOc, n.d.).

Table 2. Transformation of definitions of industrial design/er.

Definition of industrial designer by ICSID in 1959 (WDOa, n.d.):	"An industrial designer is one who is qualified by training, technical knowledge, experience and visual sensibility to determine the materials, mechanisms, shape, colour, surface finishes and decoration of objects which are reproduced in quantity by industrial processes. The industrial designer may, at different times, be concerned with all or only some of these aspects of an industrially produced object. The industrial designer may also be concerned with the problems of packaging, advertising, exhibiting and marketing when the resolution of such problems requires visual appreciation in addition to technical knowledge and experience. The designer for craft based industries or trades, where hand processes are used for production, is deemed to be an industrial designer when the works which are produced to his drawings or models are of a commercial nature, are made in batches or otherwise in quantity, and are not personal works of the artist craftsman."
Definition of industrial designer by ICSID in 1960s (WDOa, n.d):	"The function of an industrial designer is to give such form to objects and services that they render the conduct of human life efficient and satisfying. The sphere of activity of an industrial designer at the present embraces practically every type of human artefact, especially those that are mass produced and mechanically actuated."
Definition of industrial design by Tomas Maldonado in 1969 (WDOa, n.d.):	"Industrial design is a creative activity whose aims is to determine the formal qualities of objects produced by industry. These formal qualities are not only the external features but are principally those structural and functional relationships which convert a system to a coherent unity both from the point of view of the producer and the user. Industrial design extends to embrace all the aspects of human environment, which are conditioned by industrial production."
Definition of industrial design in 2015 by World Design Organization (WDOb, n.d.):	"Industrial Design is 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. Industrial Design bridges the gap between what is and what's possible. 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. At its heart, Industrial Design provides a more optimistic way of looking at the future by reframing problems as opportunities. It links innovation, technology, research, business, and customers to provide new value and competitive advantage across economic, social, and environmental spheres."

As presented in the table, while the prior definitions embrace industrial design as a field of creative activity with an emphasis on the producer, user, and manufacturing environment, latter definitions expand it to strategic problem solving process with multi-faceted objectives aimed at the innovative product, service, system, and experience designs.

Also, in line with the changing context of the industrial design profession, the definition of the designer has been transforming. With this transformation, designer is embraced as an expert who is not only able to take knowledgeable decisions regarding form and technical qualities of a product, its mass production, and distribution, but also on a range of complex problems humanity faces that needs to be embraced innovatively on a systemic level.

Indeed, one of the reasons of this transformation can be related to responsible design vision (Papanek, 1971). In this direction, Thackara (2005) argues that the domain of design needs to consider ethics and responsibility regarding the crisis design actions led to. According to the author, designers are now working on services and systems that are "less environmentally damaging, and more socially responsible" (p. 7).

Seeing sustainability-orientation as a trigger of this change, Diehl and Christiaans (2015) also discuss that the shift in the roles of designers happens in parallel to the transition in the new product development context. Due to the advantages in sustainability, companies adapt to the changes in today's world by offering more product, service, system (PSS) solutions rather than new product development (NPD) solutions. This transition broadens the scope of design while transforming the roles that designers take.

As the goal of the design process shifts from products to services, companies began to consider design *as a methodology* to answer the demands of the new world in an innovative way. Meanwhile, designers' ways of thinking gains significance as they can be key to address the challenges creatively. For Muratovski (2015, p. 4), "a design methodology, once used for designing products, is now used for designing systems, processes, services, digital interfaces, entertainment, communications and other kinds of human-centered

activities". According to Borja de Mozota (2010, n.d.), the field of design has been experiencing a transition from "design you can see, to design you can't see". The author describes two domains of design as *meta-design*, and competence-led *basic design* direction, which is rooted in seeing design as a *radical strategy*. He associates *meta-design* with *service-design* and *aesthetics economies.* These are respectively built on service development, customer experience and relationships, and assessment of aesthetics. The meta-design approach incorporates creative industries together, empowers autonomy and individual creativity, and gives rise to participatory approaches such as *user-centered design, co-design,* and *inclusive design*.

On the other side, design as a *radical strategy* highlights the development of *internal resources* of a company through *collective learning*, leading to sustained *competitive advantage*. According to the author, designerly skills are critical to approaching the complex problems of today's world. In parallel to this, attainment of the emerging assets, skills, and values empowers organizations to adapt to today's world. Hence, design as a radical strategy works as a tool for an organization to gain the core competencies (Figure 3).

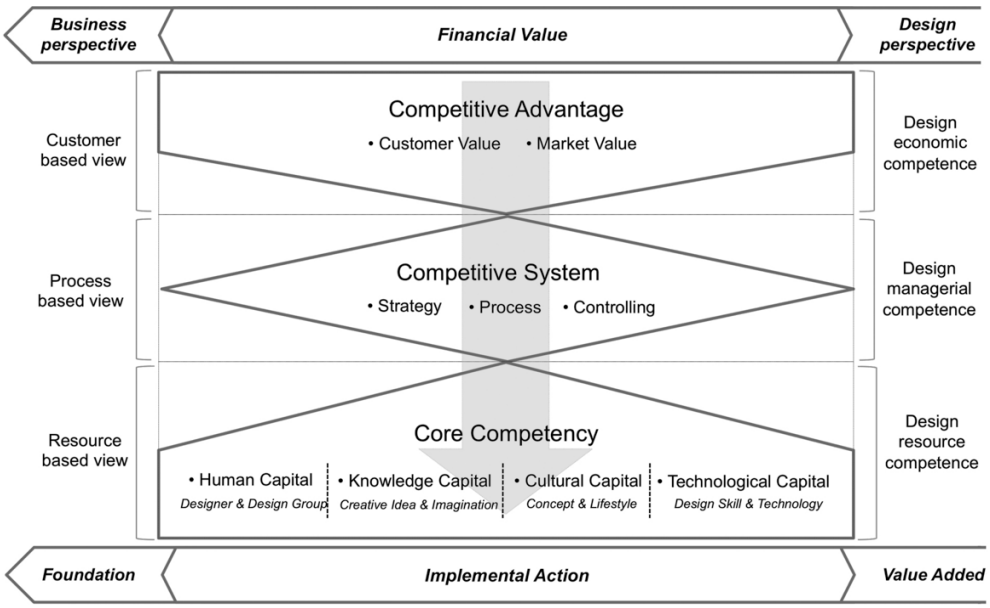

Figure 3. The design strategy for resource development (Borja de Mozota, 2010, n.d.).

Similarly, Muratovski (2015, p. 3) argues that “design is now seen as a field of thinking, rather than making”. According to the author, *design thinking competence* has been gaining credibility through the rise of companies that play a dominant role in the market with design-led innovations. Respectively, having design thinking competence has been embraced as an internal element of disruptive innovation process, which is prior to competitive power. Moreover, the author argues that design thinking plays a crucial role in creating a learning environment for gaining competencies that lead to disruptive innovation. This has been due to the prioritization of the *process* rather than the *outcome*, in contrast to what conventional development approaches offer. As a result, *design thinking* turns into competence that companies are trying to build internally in order to embrace the challenges of the present day.

These studies point at a transformation in the practice of design. Meanwhile, organizations embrace design as a means, rather than ends, in adapting the changes of the world. Along with this change, designers exert a wide range of responsibilities with enriched competencies in alternative contexts. Following sections touch upon the emergent peculiarities concerning the roles, skills, and workstyles of designers.

2.1.1. Emergent Designer Roles in the Contemporary World

This section covers the literature about the diverse sets of roles designers take. The literature is reviewed based on a range of domains that may determine the roles of designers in organizational settings. The approaches are introduced respective to the transition of the designer roles that is causing the boundaries between designers, researchers, and users to dissolve, and various roles that designers take through collaborations, PSS projects, and in organizations.

Starting with an approach from the field of design, one of the most well-known approaches on the transformation of designer roles is offered by Sanders and Stappers (2008). The authors discuss that the field of design has been experiencing a transition under the prominence of participatory approaches over

user-centric perspectives. From this viewpoint, users are no longer subjects of research; instead, they are becoming partners of the design process. While this shift causes designer and researcher roles to converge, users are no more passive stakeholders; they are partners in the design process. The following figure shows the landscapes of design in terms of the position of the actors: designer, researcher, and user.

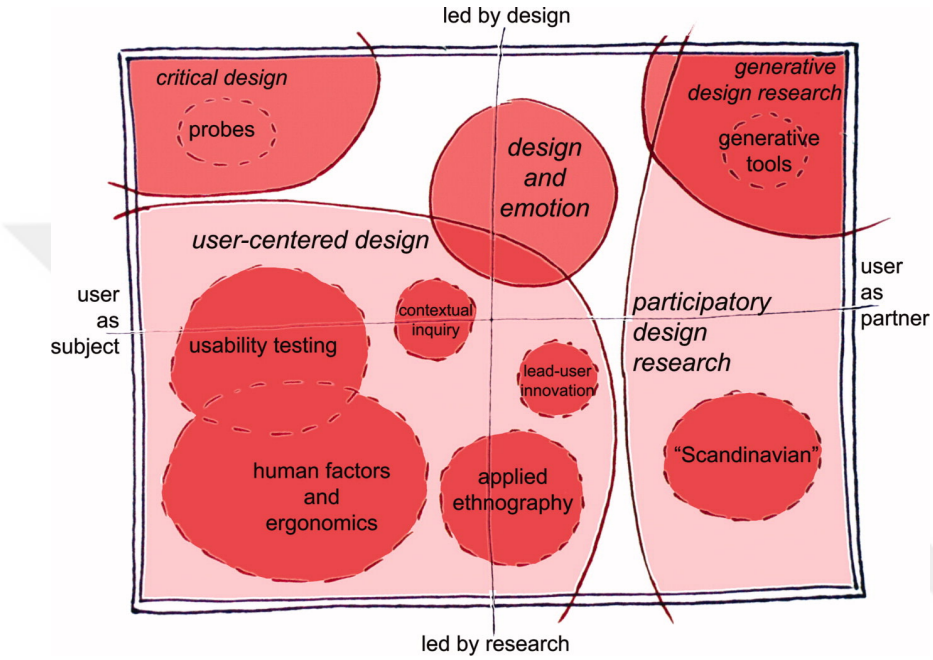

Figure 4. Landscapes of human-centered design research (Sanders and Stappers, 2008, p.6).

The authors argue that the division between these actors has been dissolving with the prominence of the collaborative design (co-design) practice (Figure 5). The designers/researchers are becoming facilitators instead of experts who embrace users as subjects, and users are becoming co-designers and the partners of the design processes. This state has been causing the roles to become more and more intertwined, along with the rising importance of participatory design over user-centeredness.

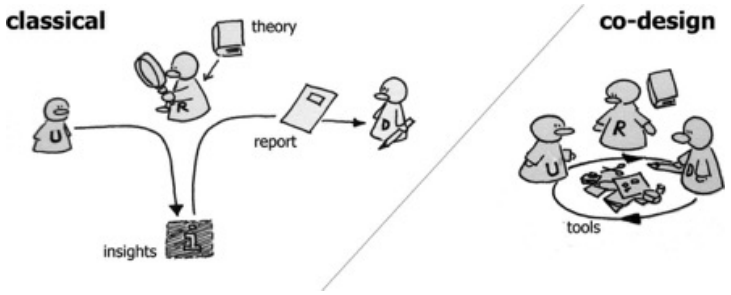

Figure 5. The roles in the classical design and co-design processes (Sanders and Stappers, 2008, p. 11).

Sanders and Stappers (2008) also argue that users, as the experts of their experiences, will become co-designers, who apply their creativity through the design process. In this collaborative activity, while researchers' translator role, which is revealing and communicating the perspectives of users to designers, will dissolve, a new role, regarding the facilitation of users' creativity by using systematic methods and tools, will emerge. Along with this change, designers will no more be the designer of products alone; they will be the design thinkers who apply their skills in the solution of complex, systemic problems. Moreover, they will be playing more dominant roles in co-design teams with their visions about the future, generative tool development skills, trend analysis competence, and their in-depth expertise in design specializations.

The approach of Sanders and Stappers signals the merging of designer and researcher roles. Users are involved in the design process with their creativity, and designers take responsibility to facilitate their creative process. While the facilitator role becomes a crucial approach in embracing today's problems, it is not the only emerging role for designers.

Looking wider at the roles of designers, Inns (2007, pp. 24-26), offers another perspective to the roles that 21st century designers increasingly take (cited in Demir, 2016):

1. Negotiator of value: Designers take part in decision making in regard to the assessment of value in multidimensional aspects, such as sustainability and ethics.

2. Facilitator of thinking: Designers leverage thinking skills of others with design methods and tools.
3. Visualizer of the intangible: Designers turn abstract ideas into tangible ones by utilizing visualization and prototyping techniques. Moreover, they visualize systems, relationships, emotions, experiences, and networks.
4. Navigator of complexity: In a world of ambiguities and complex systems, designers must understand complexity and empower others to embrace it.
5. Mediator of stakeholders: As design turns into a process with multi-stakeholders, designers begin to mediate varying interests of stakeholders involved in a design project. They work on meta-design and visualization in order to embrace complexity.
6. Coordinator of exploration: Designers need to guide the process of exploration where they constantly search for new ideas that increase innovative power.

The approach of Inns provides a wide and process-oriented explanation to the roles of designers. Similar to Sanders and Stappers, the author also emphasizes the facilitator role, but it is the only role given that design turns into a collaborative process; mediation of stakeholders emerges as an alternative role within collaborative agenda. As the design process begins to take place more and more in a collaborative environment with diverse objectives of multiple stakeholders, it demands to embrace and manage ambiguity cleverly at the background. Here at this point, the complexity of the design process needs to be handled by designers through a range of roles taken such as navigator of complexity, mediator of stakeholders, and visualizer of the intangible. Moreover, he proposes the role of the negotiator of value, by which designers foresee the value in actions holistically.

Emphasizing collaboration as the emerging practice of designer, several case studies exemplify the roles designers take through a collaborative process. For instance, Raijmakers et al. (2012) report the roles that designers play by examining the CRISP research programme, which takes place with the

collaboration of Dutch universities and industry. The authors suggest that designers play a significant role in organizing the networks with flexible social roles such as *collaborator, facilitator, instigator,* and *researcher*:

1. Collaborator: In pursuit of new ways what bring different stakeholders, such as industry and academia, to work together at their own pace.
2. Facilitator: The expert who facilitates communication among the stakeholders via workshops.
3. Instigator: The provocateur who contemplates on possibilities with approaches such as speculative design.
4. Researcher: The expert who tries to find answers to complex questions using the medium of design.

Moreover, the Ph.D. research carried out by Tan (2009) identifies the roles taken throughout the projects of a design initiative, Dott 07 (Designs of the time), and provides a closer examination to the projects in collaboration with public sector organizations and local communities. With this research, seven roles for designers are recognized:

1. Designer as co-creator: Designer applies collaborative (co-design) methods to address the challenges of and with the community.
2. Designer as researcher: Designer conducts research to facilitate decision-making in a human-centered and visually communicating way.
3. Designer as provocateur: Designer reveals unorthodox opportunities for design solutions by utilizing design-led research approaches.
4. Designer as social entrepreneur: Designer works in collaboration with entrepreneurs to leverage the potential of generating innovative and financially sustainable solutions.
5. Designer as facilitator: Designer facilitates the discussion among the members of a community to reconciliate their vision on behalf of inclusion, communication, and responsibility.
6. Designer as capability builder: Designer is an enabler who works to address complex problems by utilizing the methods of design thinking.

7. Designer as strategist: Designer acts as a strategist who invents policy of actions for social good.

These case studies add further dimensions to the approaches available. Reijmakers' instigator and Tan's provocateur propositions are similar given that they embrace the designer as a professional who expands the solution space with unconventional approaches. Other than this, designer as researcher definition goes beyond researching users, and extends to researching the complex challenges. Furthermore, the social entrepreneur, capability builder, and strategist roles by Tan signify a catalyst role, which is also in line with seeing design as a way of *thinking rather than making* (Muratovski, 2015).

In the abovementioned cases, designers take a wide range of roles depending on the objectives of the projects, i.e., collaboration of industry and university, or public sector and local communities. In this respect, it is also worth examining what roles designers take through the development of products, services, and systems.

By investigating the PSS projects, Diehl and Christiaans (2015) describe six directions that designers play roles in, and then list three skills which are key to change an organization towards the PSS direction (Table 3). Having common peculiarities with the approach of Inns (2007) for the understanding of complexity, the significance of their approach comes from the objective of complexity reduction, with the roles taken in problem solving, and by visualization throughout the PSS development.

Moreover, the authors discuss that designer skills are impactful for leveraging the capabilities of an organization by transmitting skills and influencing the organization with the mindsets necessary to catch the patterns of tomorrow. This approach gives rise to a perspective in which designers are the agents of change at an organizational level.

Table 3. The roles and skills of designers in PSS development (Diehl and Christiaans, 2015).

	Description	
Roles	***Designer as co-creator and human-centered focus***	Empathy with multiple stakeholders throughout the collaborative design processes.
	Designers as guardians of experiences	Ensure coherent experiences in every touch point of PSS.
	Designers are future oriented	Familiarity with future-orientation that help working on uncertain context of PSS development.
	Designers as problem solvers	Cope with complexity, and communicate design goals clearly.
	Designers as visualizers	Understand abstract insights through collaborations and complex projects, and make them communicable via visuals.
Skills	***Unravelling the underlying questions at the start***	Form a clear project focus by asking what and why questions.
	Empowering internal stakeholders	Stimulate change (for PSS direction) by transferring skills within the organization.
	Changing mindset	Persuade organization and leverage implementation of ideas for future readiness with designerly skills.

Similar to this perspective, an earlier work of Kelly and Littman (2005) explores various personas that are associated with increasing the innovation competence of a creative company. By examining the practices of the design consultancy firm IDEO, the authors identify ten roles (personas) that are core to increase innovation capabilities of companies. These roles draw on *learning, organizing,* and *building* objectives of the organization. While *learning roles* provide means to adapt to the rapid changes of the world, *organizing roles* expand the scope of solutions in order to choose the best from available options, and *building roles* are necessary to execute the process successfully. The roles are explained below:

Learning roles:

1. The anthropologist: As a person in touch with customers, an anthropologist conducts field research and analyzes how customers use and engage with products.

2. The experimenter: As a person who learns by doing, turns ideas into tangible prototypes, tests them and iterates this process until reaching a solution.
3. The cross-pollinator: Triggers innovation by transferring insights from a wide range of domains, and connecting ideas, people, and technology.

Organizing roles:

4. The hurdler: Copes with constraints and challenges by approaching them using creative perspectives.
5. The collaborator: Acts as an interface between different actors; brings diverse groups together leading to solutions at the intersection of multi-disciplines.
6. The director: Is able to bring talented team members together and motivate them to reveal their creative selves.

Building roles:

7. The experience architect: Is the designer who designs new customer experiences that connects profoundly with the needs of people.
8. The set designer: Designs a workspace which boosts creativity.
9. The caregiver: Is a person who is able to feel for the customers with a positive, human-centered attitude that leads business success.
10. The storyteller: Is a person who communicates the values and traits of a culture with narratives that escalate motivation and awareness.

The approach of Kelly and Littman is significant as their work forms the roots of design thinking (DT) at an organizational level, which is later explored by the global design agency IDEO, at a greater level. They describe personas in relation to the design process at a creative organization. In line with the approaches discussed previously, Kelly and Littman show the need to reduce complexity with the hurdler role, and the collaborator role with an emphasis on the collaborative process. Moreover, they add the building roles, formed by the strong social skills with the ability to empathize with people, either through envisioning human-centered experiences and touchpoints, or empowering organizational culture within creative offices, and through storytelling.

As presented in this section, many new designer roles emerge within diverse contexts. The approaches point at several roles taking shape from the necessity of collaboration, holistic thinking, embracing complexity, and triggering change in the organizations. Moreover, it becomes apparent that the roles are intertwined with skills enabling designers to exert a wide range of responsibilities. Therefore, it is valuable to examine the skills designers apply in the contemporary world. The next section provides an overview of the skills of designers.

2.1.2. Changing Skills to Embrace Complex Global Problems

Designers make various contributions in different contexts with a wide range of skills. For Norman (2010), the transition in the field of design towards service, interaction, and experience development requires design professionals to approach today's challenges with broader problem-solving skills. And, these challenges depend less on traditional design skills regarding form, function, material, or manufacturing, and more on non-traditional social skills. Similarly, Bohemia and Ghassan (2011) argue that we need to incorporate skills from the fields, such as social sciences, to address the challenges. Moreover, Manzini (2011) discusses that designers should be prepared for the future with the skills necessary for being the agents of change to tackle complex, global issues of the contemporary world. While the field of design has been researching the core skills that are necessary to confront the complex problems ranging from PSS development to social impact, the skills of designers seem to be related to the objectives of the design process.

According to Press and Cooper (2016, pp.198-200) the skills applied in alternative contexts will determine the roles "new" designers take. But on common grounds, designers are:

- Intelligent makers: Designers are *craftspersons* who use skills and knowledge to make things work. Meanwhile, their *creative problem-solver* and *reflective thinker* skills empower them as intelligent makers.
- Knowledge workers: Designers are *active learners*; they can understand, apply, and create knowledge through practice, then communicate this

knowledge within a flexible network, adding *communicator* and *networker* on top of active learning skills.

- Sustainable entrepreneurs: Designers need to exert *ecologist*, *business strategist*, *manager*, and *marketer* skills to survive the sustainability of a businesses.
- Active citizens: Designers actively participate in responsible actions for others across the world with their *empathizer*, *social initiator*, and *internationalist* skills.

Their approach points at not only designers' maker role but to several others, in which designers are involved in the challenges of the contemporary world for knowledge creation, business, and responsibility with their new skills.

Another scholar, Borja de Mozota (2010; 2011), explains the significance of designer skills in today's macro-economic transition. According to the author, designers are influential in triggering the change with their human-centered attitude; they reconstruct the *down-up* economy, and more importantly, they transform organizations towards this end. The author argues that designers' knowledge, values, applied skills, and understanding skills are necessary to create knowledge capital of organizations (Table 4). Moreover, their "risk-taking, experimentation, teamwork ability, narrative building, holistic thinking, and open-mindedness" skills. (Table 4, items in italics) are necessary "to transcend the existing barriers of industrial *silos*" (p. 16). With this tendency, designers transfer their skills to organizations aiming to transform. Moreover, their skill set enables them to go beyond conventional jobs as in in-house corporate designers, while they embrace larger problems requiring holistic and systemic perspectives.

Table 4. Design skills (Borja de Mozota, 2010, para. 16).

KNOWLEDGE	VALUES	APPLIED SKILLS	UNDERSTANDING SKILLS
Design process	*Risk-taking, Managing uncertainty*	Practical design skills, *Prototyping*, Drawing	*Observation*
Material	Originality	Creative techniques, Lateral thinking	Research
Market	Anticipating future trends	Commercial skills	Logical thinking
Technology	Proactivity in developing relationships	Communication skills (presentation and report writing)	Analyzing, Prioritizing, Structuring problems
User awareness	Open-mindedness	Computer skills	*Scenario building, Narrative*
Culture	Understanding transdisciplinary context	Design for manufacture	Synthesizing, *Holistic thinking*
Aesthetic awareness	*Focusing on usability*	Project management	Intuitive thinking and action
Human factors	Attention to detail	Optimization	Consumer and stakeholder needs
Manufacturing process	*Learning from errors*	*Teamwork*	*Human empathy*

Designers' role in changing an organization is also emphasized by Price et al. (2018). The authors discuss that design is increasingly becoming a competence that organizations want to obtain in order to adapt to social, technological, and market-related changes. Meanwhile, designers act as design innovation catalysts; they facilitate the development of design competencies within an organization and perform design-led innovation with teams to transfer their way of learning to team members. They apply their design knowledge, and skills, business knowledge and understanding, cognitive abilities, customer and stakeholder centricity, personal qualities, research knowledge and skills. A significant peculiarity of this approach comes from underlying the importance of trust and knowledge to transform an organization (Figure 6).

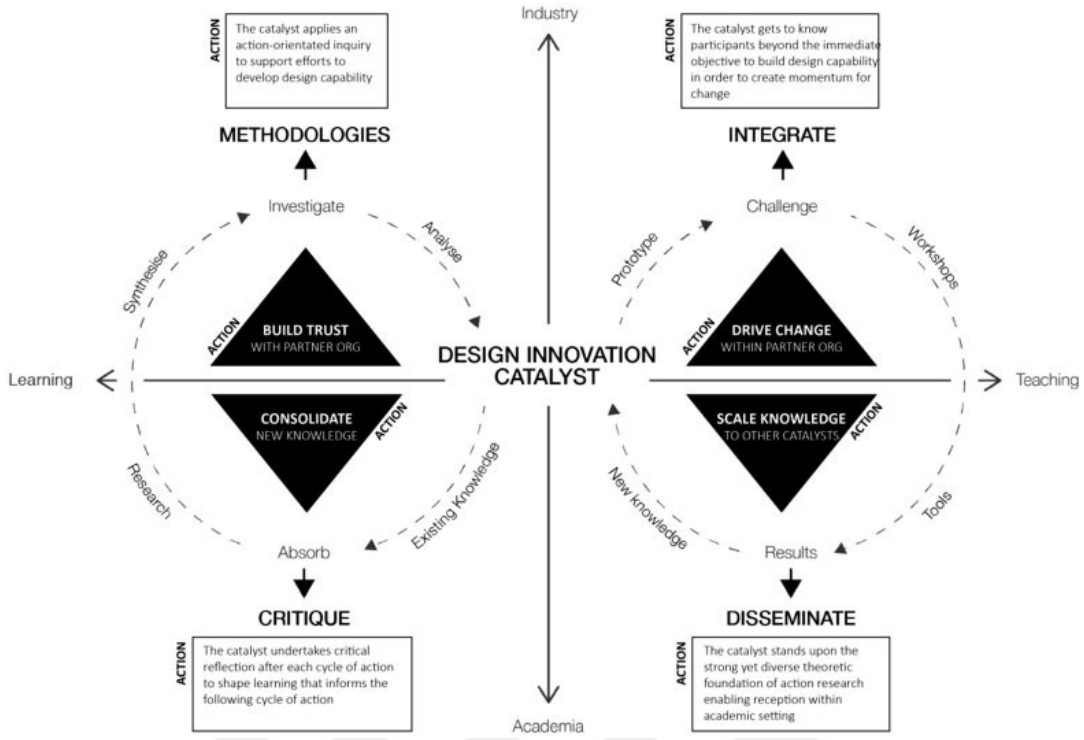

Figure 6. Design Innovation Catalyst Framework (Price et al., 2018, p. 15).

All these roles and skills point at a change in the practice of design. Moreover, with the transition towards a collaborative, social-impact driven formulation of design, human-centered design (HCD) gains significance. HCD offers a people-centric rather than product-centric process, which is accompanied by designer skills to solve the complex problems of humanity. Concerning its position, design becomes a multi-disciplinary process, including not only designers but also professionals from diverse backgrounds familiar with the design process (Brown and Wyatt, 2010). This approach encourages gender-balanced, multi-disciplinary teams containing three to eight people from diverse disciplinary and educational backgrounds, having dedicated workspace, and finite timeframes of work (IDEO, 2015, pp. 10-13). Moreover, they emphasize the importance of T-shaped skills in order to produce a wide range of ideas. The "T" is a metaphor for representing one's disciplinary skills (vertical line) and design thinking skills (horizontal line on top) that ease working comfortably within the interdisciplinary environment. Meanwhile, the skills, such as *openness*, *curiosity*, *optimism,* and the *tendency of learning* by experiencing, determine one's ability to apply core skills in the solution of a problem, while also putting people's needs at the core of the process.

In parallel to this direction, a research carried out by Kramer, Agogino, and Roschuni (2016) illustrate 101 competencies for human-centered design that are drawn on the design thinking and human-centered design (See Appendix A for the list of competencies). The significance of their approach comes from incorporating the cultivated mindsets, specialized disciplinary skills, basic skills, and the contextualized tasks extensively into their analysis. They define cultivated mindsets as a way of thinking that forms one's values with the norms accepted over time, specialized disciplinary skills gained as a result of a formal training, basic skills as the skills necessary to pursue HCD, and contextualized tasks as the circumstances that require multiple skills. The authors point at HCD being a collaborative activity with diverse disciplines involved. Their study indicates that in order to answer the demands of an HCD process, designers need to form teams to cover a broad range of competencies listed by their research.

To sum up, the studies point at diverse sets of roles and skills applied in alternative contexts while designers' skills will be emerging as regards to the projects they are involved in. As in the emerging roles, there is an emphasis on the skills for collaboration and problem solving at a systemic level. Moreover, the skills to facilitate change are significantly emphasized. More importantly, designers' ways of learning seem to be the underlying phenomenon that determines the position of designers for embracing the design problems of the contemporary world. Therefore, the learning methodology of designers needs further exploration on behalf of the complex problems of the world (See Section 3.3.1. Background on Experiential Learning).

2.1.3. Emergent Workstyles in the Contemporary World

In addition to the roles and skills of designers, it is worth examining the changing context of work as the landscapes are impactful in forming the roles, and skills of designers. The workstyles of designers have been changing in parallel to the varying context of work. The prevalence of ubiquitous technologies triggers a discussion regarding what workspace means and how it relates to the contemporary world. As Felstead and Jewson (2012, p. 390) emphasize: "The

twenty-first century is witnessing the emergence of a new phase in the socio-spatial organization of work, with radical implications for the experiences and attitudes of workers". The transition in the workstyles, workplaces, and workspaces have been in parallel to the values of the century. As this transition leads to alternative contexts of workplaces such as *collective offices, home-office,* and *working on the move,* research suggests that *learning* becomes the ultimate goal in contemporary spaces of work (Felstead and Jewson, 2012; Kersh, 2015, 2017; Kersh and Evans, 2017).

Workspace becomes a vague term when the boundaries between physical context and learning spaces are blurred (Kersh and Evans, 2017). A workspace has been effective in bringing employees together to apply their qualifications obtained prior to their jobs, but also for training employees to acquire new competencies through mentorship, innovative apprenticeship, or reflective practice (Kersh and Evans, 2017). However, recent changes and the prevalence of mobile technologies extend *learning* beyond space (Kersh and Evans, 2017).

The study of Kersh and Evans (2017) reports on three cases of self-created learning spaces in the sector of information technology. The authors explain the role of modern and virtual technologies in various, self-created, and globalized learning spaces. Based on the cases, they offer three dimensions of learning spaces, being individual, environmental, and institutional. While individual learning spaces are created by individuals for working and learning, and it demands the creativity and proactivity of the individual; environmental learning spaces include spaces such as home, library, and even trains, and gives employees an opportunity to work based on personal agenda and goals. The latter, institutional learning, allows individuals to share experiences and learn from each other within a context. These spaces are impactful in the emergence of new skills associated with new places of learning, such as transferrable skills obtained by adapting variant learning spaces.

As learning spaces become socially constructed, factors such as motivation, previous experience of an employee, and expected outcome influence the way learning happens (Kersh and Evans, 2017). In an inquiry about teaching, Kersh

(2017) examines two work-related learning spaces of employees: formal/academic, and experiential learning spaces. While the prior relates to the acquisition of theoretical knowledge about the practice, the latter is determined by the biography of the learner; knowledge, habitus, dispositions, and values linked with learning, that lead to practices. The author concludes that *experiential learning* leverages the development of individual motivations, skills, and outcomes.

This section examined the transformation in the practice of designer roles, skills and workstyles. It showed that designer roles and skills emerge around the patterns of collaboration, transformation and change, holistic and systems level approaches, and complexity reduction. It revealed human-centered design (HCD) as an emerging practice of design, which will be explored in in-depth, in the following section.

2.2. Human-Centered Design

Human-centered design (HCD) is an approach that incorporates the human perspective into the design process (Maguire, 2001). Although an early body of research in HCD belongs to the usability domain, in which HCD and user-centered design (UCD) approaches are used interchangeably (See Maguire, 2001; Jokela et al., 2003; Chammas et al., 2015), HCD is characterized by designing at a wider socio-technical system, since any design potentially impacts all the humans involved, not only users (Gasson, 2003; ISO, 2010).

The principles of HCD were framed as early as 1999 with ISO 13407 standard (ISO, 1999). The standard aims to advance the usability of digital products and systems by incorporating the human perspective into the design process (Maguire, 2001). The latter, ISO 9241-210:2019 standard, defines *human-centered design* as an "approach to interactive systems development that aims to make systems usable and useful by focusing on the users, their needs and requirements, and by applying human factors/ergonomics, usability knowledge, and techniques". According to this standard, HCD "enhances effectiveness and efficiency,

improves human wellbeing, user satisfaction, accessibility and sustainability; and counteracts possible adverse effects of use on human health, safety and performance" (ISO, 2019).

The HCD process is characterized by five phases under ISO 13407:

1. "Plan the human-centered design process.
2. Understand and specify the context of use.
3. Specify the user and organizational requirements.
4. Produce designs and prototypes.
5. Carry out user-based assessment." (Maguire, 2001, p.589).

Moreover, the HCD process takes place by following principles that are complementary to other development methods. These are:

- "The active involvement of users and clear understanding of user and task requirements,
- An appropriate allocation of function between user and system,
- Iteration of design solutions,
- Multidisciplinary design teams." (Maguire, 2001, pp. 588-589).

The newer version, ISO 9241 standard, explains the principles further by adding two more directions to elaborate the HCD process.

- "The design is based upon an explicit understanding of users, tasks and environments.
- Users are involved throughout design and development.
- The design is driven and refined by user-centered evaluation.
- The process is iterative.
- The design addresses the whole user experience.
- The design team includes multidisciplinary skills and perspectives." (ISO, 2010, p.5).

Coming from such a well-established field, today, HCD approach is not limited to interactive systems design. This approach is examined thoroughly in the next section.

2.3. Human-Centered Design by IDEO

A decade ago, Sanders and Stappers (2008) emphasized the significance of incorporating users as a creative partner in the design process. According to Sanders (2006), there has been a clash between European and American design approaches; while the prior has been rooted in a participatory perspective, the latter has been consumer-driven, which is seen antithetical to the European participatory design view. Besides, there were reasons which prevented companies to take steps towards collaborative design. The power structures, the culture of consumption, dependency on significant investments, and manufacturing/technology-driven product development instead of user-led product development can be counted among the reasons.

Nevertheless, in the recent years, companies with established traditions, have been prioritizing the collaborative creative process. In this, the efforts of the global design company IDEO and its non-profit organization IDEO.org seem to play a significant role in bringing participatory approaches to the practice of design with human-centered design approach. Together with the change in the orientation, both participatory discourse and designers as facilitators are seen integral to increase a company's competitive advantage.

While staying close to the origins in terms of people-centeredness, process, and principles, a broader definition of HCD happens to emerge. The efforts of IDEO in HCD domain dates back to 2008; upon the request of Bill & Melinda Gates Foundation, IDEO introduced a toolkit named *human-centered design*, which combines the *design thinking methodology* with the processes of non-governmental organizations aiming to develop products for the developing world (Brown and Wyatt, 2010). The approach is rooted in the design thinking (DT) vision which argues that wicked problems can be understood iteratively in socially complex contexts (Kramer et al., 2016).

IDEO encourages industry and other stakeholders to apply the steps of the human-centered approach while partaking in the challenge of complex problems that humanity faces (Brown and Wyatt, 2010). Being told as an approach that is rooted

in *designers' ways of thinking*, the company introduces HCD as a new method for businesses and non-profits to tackle today's complex social problems, such as designing products for people with low-income (Brown and Wyatt, 2010). It is a flexible, iterative, and participatory approach that puts human needs at the core while it can be applied with other methods based on the needs of the design process (IDEO, 2015).

Moreover, this approach emphasizes *desirability*, *feasibility*, and *viability* of design solutions. From this perspective, the outcomes of the HCD process are built based on the needs of the community and achieved considering technical/organizational feasibility, and financial sustainability (IDEO, 2015, pp. 6-7).

Methodologically, HCD helps multinational corporations to innovate by incorporating three objectives into their design process:

- *(H)ear* people's needs,
- *(C)reate* innovative solutions for them,
- *(D)eliver* financially sustainable solutions (IDEO, 2015, p.3).

Achieving these objectives is possible through phases of design thinking which are codified as (IDEO.org, 2015, p.11):

- *Inspiration* is for the identification of people's needs, problems, and context. In this step, the design team immerses in the project, familiarizes with the project brief and requirements, and explores the needs and problems of people, preferably through field visits.
- *Ideation* is the step of generating various design concepts rooted in human-centered insights. The design team synthesizes their understanding from the design research to generate ideas.
- *Implementation* is the process of prototyping and testing. During this step, design teams transform ideas into products and achieve the plan. This phase requires prototyping and iterations, given the unpredictable complexities of the design process.

IDEO provides a list of methods to apply while following the steps above. The

company suggests the utilization of the human-centered design toolkit and appropriate methods in different scenarios, such as projects taking one week to several months, where there is knowledge available but the lack of an actionable plan, and the activities of the organization need to be supported with human-centered methods and perspectives. The methods to be adopted depend on the needs of the organization. Table 5 summarizes these methods from IDEO (2015).

Moreover, the mindsets of human-centered designers are (IDEO.org, 2015, pp.19-25):

- *Creative confidence:* to keep innovating whether the outcome fails or succeeds.
- *Make it:* to turn abstract ideas into tangible with quick prototyping.
- *Learn from failure:* to learn by testing ideas and getting feedback from these.
- *Empathy:* to put ourselves in the shoes of other people to understand their needs and perspectives.
- *Embrace ambiguity:* to be in the opinion that there are various answers to a problem, and that finding the right answer through an ambiguous process.
- *Optimism*: to have an optimistic attitude towards achieving regardless of the inevitable obstacles.
- *Iterate:* to advance the ideas by iterating, getting feedback and evolving.

To sum up, HCD synthesizes DT methodology with the needs of the contemporary complex problems, such as designing for low-income communities. It highlights multi-facets of design that needs to optimize the approaches concerning human, business, and technology. It shows that DT is further than a methodology; it is a mindset to embrace complex problems in an orderly way.

Table 5. Steps of human-centered design (HCD) process (IDEO, 2015).

	Hear	**Create**	**Deliver**
Goals	Understanding people's needs, hopes, aspirations for the future. It helps to identify: • Whom to talk • How to gain empathy • How to capture stories	Generating various solutions by interpreting the insights. Filtering ideas based on *desirability*. Possible through: • Making sense of data • Identifying patterns • Defining opportunities • Creating solutions	Assessing desirable ideas with respect to feasibility and viability by following the steps below: • Identify required capabilities • Create a model for financial sustainability • Develop an innovative pipeline • Plan pilots and measure impact
Outputs	• People's stories • Observations of constituents' reality • Deeper understanding of needs, barriers, and constraints	• Opportunities • Solutions • Prototypes	• Feasibility assessment • Viability assessment • Innovation pipeline • Implementation plan • Learning plan
Theory	Qualitative research methods	1. Synthesis 2. Brainstorming 3. Prototyping 4. Feedback	Build capabilities and financial models
Steps	1. Identify a design challenge 2. Recognize existing knowledge 3. Identify people to speak with 4. Choose research methods • Individual interview • Group interview • In context immersion • Self-documentation • Community-driven discovery • Expert interview • Seek inspiration in new places 5. Develop an interview approach • Interview guide • Sacrificial concepts • Interview techniques 6. Develop your mindset • Beginner's mind • Observe/Interpr.	1. Develop an approach • Participatory co-design • Empathic design 2. Share stories 3. Identify patterns • Extract key insights • Find themes • Create frameworks 4. Create opportunity areas 5. Brainstorm new solutions 6. Make ideas real 7. Gather feedback	1. Develop sustainable revenue model 2. Identify capabilities required for delivering solutions 3. Plan a pipeline of solutions 4. Create an implementation pipeline 5. Plan mini pilots and iteration 6. Create a learning plan • Track indicators • Evaluate outcomes

2.4. Conclusions to Chapter 2

The world is experiencing a rapid change. The field of design and the role of designers have been gaining significance in parallel to the transformation of the new world. Whilst designers and their ways of thinking are increasingly seen integral to the solution of the social and environmental challenges, the roles, the mindsets, and skills of designers are gaining attention to solve the problems of the 21st century. Along with the expanding definition of design, capturing the roles designers take turns out to be an essential step in leading prospective actions.

The design profession has been experiencing a transition concerning the roles, skills, and workstyles. The perspectives on the changing roles of designers point at the climbing complexity of world problems, limited capabilities of conventional approaches, and the necessity to address those problems using designerly ways of thinking and doing. While designers' learning methodology becomes a medium for problem-solving, designers are more and more involved in complex social problems that require unconventional approaches.

Designers gradually apply a wide range of skills while playing new roles around human-centeredness, collaboration and mediation, complexity resolution, holistic and systems thinking, transformation and change. Meanwhile, they utilize alternative workstyles and workspaces, as values of the contemporary world determine the scope of work, and technological capabilities give rise to new forms of learning spaces. The personalized, flexible, and social learning agendas are prioritized while workspaces go beyond office environments.

CHAPTER 3

THE CHANGING SCOPE OF NEW PRODUCT DEVELOPMENT

This chapter is composed of four parts. First, the transition from new product development (NPD) to product, service, system development (PSS) is explained. Following this, the role of design in triggering the change is described with respect to its function through innovation spectrum. Then, the approaches integrated to the NPD process are examined; design thinking (DT), as one of the approaches for complex problems, is elaborated with reference to experiential learning and organizational learning phenomena. Lastly, the chapter is concluded with respect to the role of design and designers in learning organizations.

3.1. Fundamental Approaches of New Product Development

The new product development practice is rooted in the perspectives formed as early as the post-war era. For a long period, corporations, as the actors of production, were supported with policies to empower national economies (Er, 1997). Indeed, the new product development (NPD) vision has not changed until the need for a paradigm shift to occur. This section gives place to an early literature review of Goulding (1983) on NPD to present the dimensions that have shaped the practices of the current day. The author comprehensively reviews the objectives, success factors, and processes of NPD.

Objectives of NPD:

Companies innovate products in order to sustain their competitive advantage. The core emphasis is on the *survival* and *growth* principles that ensure a company is alive and expanding by addressing the needs of users and itself. The new product development is through diversification of the product range and revitalization of existing products. Explained with the following two objectives, companies aim to maintain their status quo through:

- Ensuring diversification by introducing new products to new markets either through entering a market first, imitating competitors, or acquiring other firms.
- Optimization of product-life cycle and the changing market demand so that it is profitable through sales.

Ensuring diversification can be possible by introducing novel products to the market. The novelty is associated with three characteristics: being new to needs, wants and desires, having outstanding performance in comparison to its competitors, and conveying a message with the "imaginative combination of product and communication" (Goulding, 1983, p. 6). Novelty ranges from incremental to revolutionary with the products experientially new, to products built on major technological breakthroughs.

Success Factors of NPD:

Some of the critical factors of NPD are defined as follows.

- Effective management: The success of new product development takes shape from wise management of the process, and a company's position among the competitors concerning customer satisfaction.
- Well-formulized organizational structures: An organization should have a structure for NPD (based on the studies of Chakrabarti [1974], White [1976], Sands and Warwick [1977]):
    - NPD committee: Managers from different departments meeting in an ad-hoc manner.
    - R&D department: An autonomous department for research and development.
    - New product manager: A senior manager who chairs a specialized department.
    - New product department: Better management of internal decision-making, while carrying out empowered relations with external stakeholders.
    - Project group: Members meeting in an ad-hoc manner.

- New venture group: An autonomous organization for executing the project throughout the process.
- External product development: Includes external stakeholders of the development; freelance designers, labs, consultants to compensate for missing competencies.
- Product champion: An informal organizational role for combating the drawbacks especially in the early stages of development.
- Corporate revolutionary: An innovator with the power of observation and concentration skills.

- Reconciliation of creativity and resource allocation: While creativity is a prerequisite for innovation, the resources of the company have to match the demand for serving the needs of customers successfully.
- Customer-centeredness: Customer-centeredness is emphasized as a critical quality in bridging the needs of the customers and companies. It is possible by being the choice of customers and maintaining their choice in the long run by addressing their hierarchy of needs.

Process:

The product development process is composed of sequences to be followed in order to make quality decisions from ideas to product launch. While they may differ based on the objectives of the company, the following stages are common in practice (based on Toll, 1969):

- Planning
- Market exploration
- Search for new product ideas
- Investigation of new ideas in terms of company resources and abilities
- Evaluation of new ideas
- Selection of remaining favorable ideas based on financial considerations
- Implementation of test marketing and/or national launch.

The idea generation with internal (within the company) or external partners (by consultants, university research centers) is a significant step in the new product development process. During idea generation, design methods such as

brainstorming, group discussions, or synectics can be utilized. The multiplicity of ideas is of crucial importance since they are reduced to one from many.

Ideas are screened concerning their strengths and weaknesses in the course of concept testing, product testing, financial evaluation, test market, and launch. Throughout this process, systematic methods for screening can also be applied. While concept testing requires a user-centered analysis, product testing focuses on concept validation, comparative testing, cost/profit analysis, and determining the product range. Following that, during the financial evaluation, go/no decision is made regarding the profitability of the new product. The decision may take volume sales in time, the investment cost of manufacturing and marketing, and selling price into account. Finally, during test marketing, consumer behavior can be measured in the real context, while this measurement can be accompanied by assessments of sales, marketing mix variable, production logistics, the effect on existing product lines, and development of a segmentation strategy (Goulding, 1983).

The study of Goulding (1983) identifies the prior approaches to the NPD process. The primary objective of NPD is to sustain companies in the long term and enable them to grow in time by addressing the demands of the market. Built on massive knowledge creation for an effective development process, NPD aims at utilizing a structured linear process that is enriched with methods and tools for creative/innovative thinking and follows a management strategy, which optimizes the company's resources and market needs.

Over time, several new product development process models have been developed to help companies formulate their new product development processes. While they do not agree upon a single model, they are modified based on the needs of the organization (Cooper, 1999). However, briefly, they can be explained in five themes: stage-gate, multiple convergent process, product and cycle-time excellence, total design, and third-generation NPD process models (Owens, 2009).

Owens (2009) reviews the models that empower sustainability of innovative abilities for survival. According to this review, the "stage-gate model" underlines

a process composed of a linear series of activity stages, in which the project may pass onto the following steps based on the performance with go/no decisions by several representatives from functional departments. The “multiple convergent model”, however, is an iterative model that integrates the human perspective to the process of new product development within a multi-disciplinary scheme. While this model is criticized for inefficiency due to the amount of data to be communicated, the “product and cycle time excellence model” primarily focuses on reducing the time needed for a product to enter the market considering the economics of the development process. Being different from the prior three approaches in terms of step-based methodology, the “total design” model is a collaborative method that emphasizes an evolving process, following a spiral path from formulation to evolution, transfer, and reaction stages. The steps in spirals are market, product specifications, concept design, detail design, manufacture, and sell (Pugh, 1991). Other than these models, the “requirements capture process model” embraces the requirement formation process from a lens of internal and external variables that influence the way data acquisition, data transformation, and requirement generation happen. This model sees requirement building as a subjective process and tries to integrate different perspectives based on team members’ perceptions and external activities that shape their understanding in order to create an agreed understanding of the data. The last model is a “third-generation new product development process”. Different from first-generation models that are based on handing projects to another group, and second-generation models that are a cross-discipline version of the prior, third-generation models empower the need for 4F’s, fluidity, fuzzy gates, focused (resources), and flexible agenda, instead of the emphasis on efficiency and short market entry duration (Owens, 2009).

Revealed by these models, organizations are in search of approaches that support them from multiple perspectives. From linear models of development to flexible models, alternative process models pose variant strengths and weaknesses. Nevertheless, it is also important to map the context of new product development in the contemporary world in order to reveal the needs on change. The next

section elaborates on the necessity of the transformation for the new product development paradigm, and the role of design in making this happen.

3.2. The Role of Design in Transforming New Product Development Processes of Companies

Today, the manufacturing economy has been losing power with the growth of service economies (Vasantha et al., 2011; Na, Choi and Harrison, 2017). The demand to transform from NPD to PSS, from incremental to disruptive innovations, and from saturated to emerging markets, brings forward the necessity to create and apply alternative methods that drastically change how companies think and act (Jelen and Kamboj, 2010; Diehl and Christiaans, 2015; Na, Choi and Harrison, 2017). Service-orientation comes along with the necessity to focus on the needs of customers to maintain the relationship sustainably; through complex combination of products and services (Manzini, 1993; Vasantha et al., 2011). Companies are willing to take more risks than it used to be; they are in search of new methods, tools and techniques that support them for the development of integrated systems that address people's values (Vasantha et al., 2011). And the body of NPD research is under evolution (Loch and Kavadias, 2008).

Na et al. (2017) express the increasing demand from design for its transformative power. Given that manufacturing is still a significant developmental parameter for both governments and the industry itself, the actors are concerned with regaining the competitive force of manufacturing companies and hence, reviving economies. At this point, the perspectives of design have been influential on the transformation of the innovation processes of manufacturing companies. As regards to this, design is embraced as a tool to leverage competitiveness in three domains: operational level (i.e., PSS design), strategic level (i.e., methodology/design strategy), and corporate level (i.e., philosophy/corporate-level design thinking) (Figure 7).

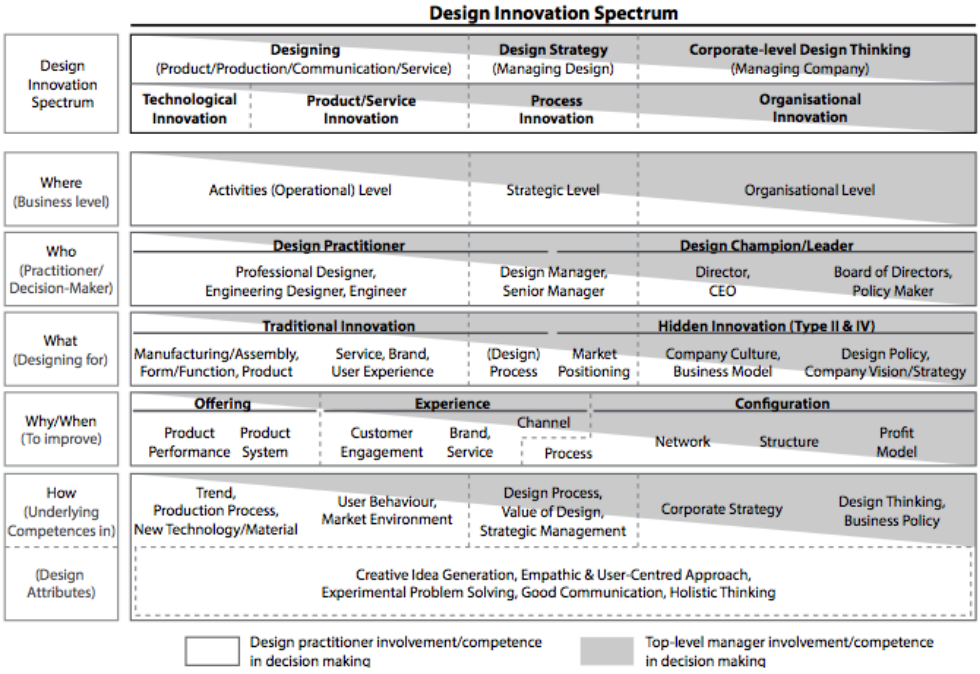

Figure 7. Design innovation spectrum (Na et al., 2017, p. 19).

Their study merges the design and innovation spectrums to explain the opportunities of design for manufacturing companies. It shows that design is a powerful tool for representing the vision for innovation symbolically via visualization, having meaningful PSSs, and impacting the way organizations innovate operationally and strategically. From this perspective, design enables solutions to the complex problems of organizations at different levels. In this end, inspiration and visualization of creativity are the effective factors. Consequently, design becomes more than an activity, rather, it is a broader phenomenon that impacts manufacturing companies holistically.

Additionally, the same study also reports on the easier adoption of design innovation spectrum approach at an organizational level when utilized by design champions, via design activities, and through success stories. Design champions (or leaders) are not necessarily designers, but senior managers who are willing to take risks to use design in the various parts of a company, such as corporate level design thinking to influence a business model, company vision, or strategy. Another means is by building trust incrementally in design with operational level design activities, and persuading senior management, or CEO, on the contribution

of design about larger benefits. Finally, sharing success stories are convincing for the adoption of the spectrum in different levels of business.

To sum up, design is more than an activity; it is also useful to influence organizations in terms of design strategies, policies or the culture shared by the entire organization. This is possible by embedding design thinking in the companies while it is a delicate process that needs to be managed considering the role of the personnel, organizational practices, and the organizational climate and culture (Micheli and Perks, 2016, p. 206). The design thinking approach will be explored in the following section.

3.3. Design Thinking for Organizations

The design paradigm has been in transformation from the early 20th century. According to Vogel (2009), design has been attributed with different objectives under the influence of the movements of the time. It was firstly influenced from the Arts and Crafts movement, while it turned into a deliberate approach for brand differentiation, and in time, it converged to strategy for design education and spread across the world with the impact of the Bauhaus school. Then, it became a strategic tool for corporations through the emergence of design consulting. In the meantime, it incorporated market segmentation perspectives, and added contemporary aesthetics and human factors into everyday products. Through time, it moved closer to human factors, utilized strategic approaches as a factor of corporate identity and internationalization, and empowered human-centered approaches with the rise of systems design. Finally, it challenged the status quo with the prominence of approaches concerning social change for low income economies and responsibility for the world. Today, “corporations are trying to build a kinder, more humane brand message that connects to the social value systems of their customers, by integrating universal design, multicultural design for emerging economies, and environmental responsibility into their products” (p. 26). Design thinking is becoming an essential approach for bridging the strategy and the design outcomes that extend from products and services to communications.

For Wiesche et al. (2018), design thinking is an approach for embracing the challenges, named wicked problems, with no obvious answers (Buchanan, 1992), on an iterative basis (Simon, 1996), through generation of solutions (Gaskin and Berente, 2011), and by representation of design models (Schon, 1992). What is significant about this approach is that the field of design creates new knowledge and learning in a topic in order to approach a problem in an innovative way (Avital and Te'Eni, 2009). Moreover, it constructs representations which lead to learning and solutions of a problem (Dorst and Cross, 2001).

There are numerous design thinking methods grounded in these principles. Although they utilize similar principles, they use different terminology and variant steps to approach any design process. For instance, while d.school at Stanford (d.school, 2010) explains DT with a five-step methodology of empathize, define, ideate, prototype, and test, d.School at Potsdam explains it with six iterative stages including understanding, observation, point-of-view, ideate, prototype, and test (Thoring and Müeller, 2011, p.138). IDEO offers discovery, interpretation, ideation, experimentation and evolution as the core principles (Design Thinking for Educators, n.d.). Luchs (2016, p. 4) from an NPD perspective, conceptualizes DT with the discover, define, create, and evaluate steps, of which the first two cyclic modes relate to identification and the last two cyclic modes aim at solving the problem. Moreover, Thoring and Mueller (2011) argue that the sequence of DT is indeed in parallel with creative thinking. Similarly, Design Council's (2020) framework for innovation proposes two diamonds model to explain that design thinking shape on divergent and convergent thinking. The following table lists the similarities among the approaches.

Table 6. Design thinking approaches.

Stanford d.school	**Potsdam d.school**	**IDEO**	**Luchs**	**Creative process**
Empathize	Understanding	Discovery	Discover	Discover (Diverge)
	Observation			
Define	Point-of-view	Interpretation	Define	Define (Converge)
Ideate	Ideate	Ideation	Create	Develop (Diverge)
Prototype	Prototype	Experimentation		
Test	Test	Evolution	Evaluate	Deliver (Converge)

Indeed, the similarities between human-centered design (See Section 2.2. in Chapter 2) and design thinking steps are apparent. Despite the differences of terminology, they emphasize a perspective shaped by the understanding of people, a clear analysis of the insights to formulate the problem, ideas shaped on top of the understanding and analysis, and experimentation with solid steps towards the solution.

Due to its impact among industrial circles, it is worthwhile to examine the design thinking methodology offered by Hasso Platner Insititute of Design at Stanford University. The design thinking process guide by d.school (2010) illustrates five iterative modes for creating meaningful innovations:

- **Empathize** mode is about gaining familiarity with physical and emotional needs, behaviors, values, and context of users. The way to do is to observe people in their real context, engage in conversations by asking *why* questions to obtain deeper meanings, and watch and listen while they perform their actions. This mode is core to capture the big picture and make connections.
- **Define** mode is about synthesizing information to set a clear vision about the project. This mode provides a focus on the problem by bringing information about users, needs, and insights together in order to describe the point-of-view (POV) statement that will guide the actions. The statement helps to inspire product development teams with factual and emotional constructs about people, make decisions comfortably, reveal criteria for assessment, and check feasibility.
- **Ideate** mode is the process of idea generation. The aim of this mode is to expand the solution space regardless of their feasibility while only a number of ideas passes onto the prototyping process. Through this process, techniques such as brainstorming, mind-mapping, and sketching can be utilized to reach new ideas systematically.
- **Prototype** mode is for generating low-resolution artifacts to get feedback from users and experts. Each prototype tries to answer a particular question. It is an iterative process and in tandem order with the test mode.

- **Test** mode is a process of taking feedback with the use of prototypes, refining prototypes, expanding the understanding about users, and revising the POV if necessary. Prototype and test modes help design teams to take actions based on what they have learned.

Among the practitioners, there has been a vivid discussion about the way design thinking methodology should be utilized. Design thinking is combined with other approaches depending on the strategy of the organization such as agile scrum, lean innovation/startup model, or combination of all (See Roach, 2015; Gothelf, 2016; Claes, 2017; Mantini, 2018).

Companies are paying attention to these methods, as they offer a procedure to embrace complex problems in a human-centered way. The Cynefin Framework will be utilized to explain complex problems (Figure 8). The framework is a holistic sense-making framework by Dave Snowden (2005). It has four domains; visible and hidden (order), and complex and chaotic (un-order).

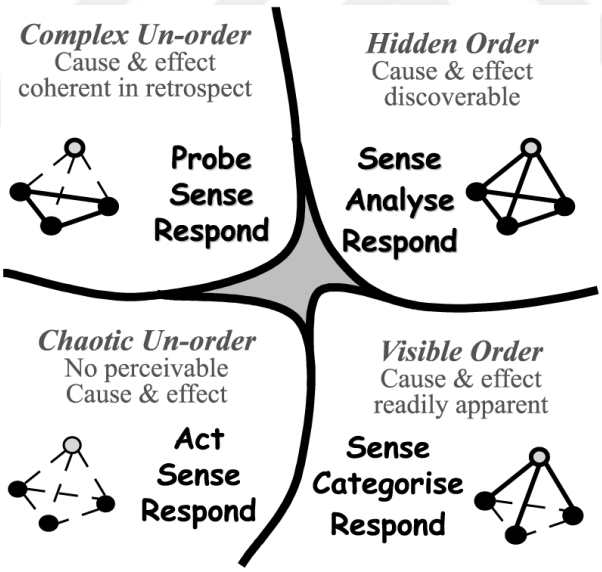

Figure 8. Cynefin domains (Snowden, 2005, p. 50).

For a complex problem, which bears complexities in terms of deficient knowledge, organizations need to probe the problem by gathering knowledge, then sense the next steps by being involved in, and respond to the problem by taking action while the outcome is the emerging practice. In chaotic problems, acting comes first, sense comes next with the assessment of the situation, and finally comes the respond mode, where the action is to move the problem to other

domains. For these types of problems, the emphasis is on the experience of the problem, where probing and acting form the basis of the steps taken. The framework is not a solution to the problems, instead it provides a holistic perspective to wicked problems, while acknowledging diversity and change over time (Hasan and Kazlauskas, 2009).

Beckman and Barry (2007) emphasize innovation as a learning process. Seeing design as a process of experiencing, and experience as a process of learning, they explore the potential of design thinking for companies embracing complex innovation challenges. In light of this argument, the next section covers experiential learning.

To sum up, the role of design in embracing wicked problems happen to be empowered regarding the methods offered by the field of design. Consequently, design is a promising tool to guide the practices of organizations in an experiential way.

3.3.1. Background on Experiential Learning

A well-known explanation onto the phenomenon of experiential learning is offered by Kolb (1984). Kolb proposes experiential learning theory rooted in the approaches of Dewey, Lewin, and Piaget, to guide effective curriculum designs. According to Kolb (2014, p. 49), “learning is the process whereby knowledge is created through the transformation of experience”. Learning happens in four cyclical modes: experiencing, reflecting, thinking, and acting. While experiences form the foundations for observations and reflections, the reflections are divided into abstract concepts that would lead to actions, and the actions guide new experiences (Figure 9).

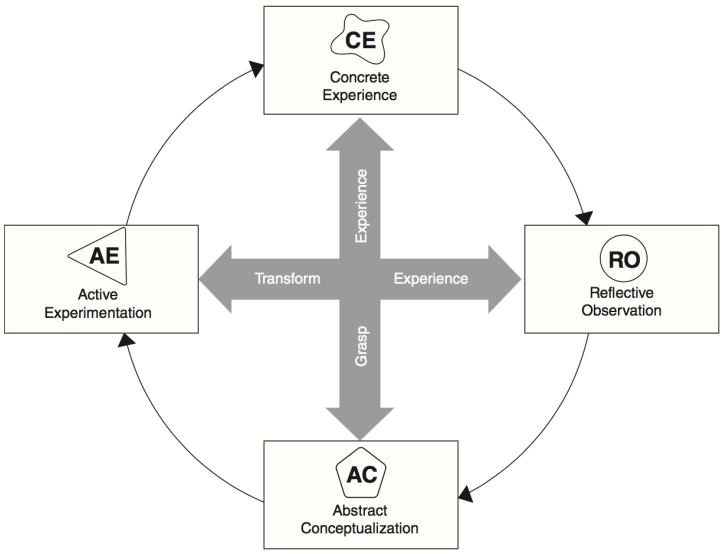

Figure 9. Experiential learning circle (Kolb, 2014, p. 51).

The author (2014, pp. 37-49) lists the characteristics of experiential learning as below:

- *Learning is best conceived as a process, not in terms of outcomes:* The objective of learning is not reaching at a fixed idea; learning is a process of ideas emerging and modifying through experience.
- *Learning is a continuous process grounded in experience*: Learning happens continuously through conscious experience of actions.
- *The process of learning requires the resolution of conflicts between dialectically opposed modes of adaptation to the world*. Learning is a process of conflict; the existing schemes of ideas may be in contrast with the newly obtained ones. However, four major abilities help the learner in confronting this challenge: concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE). Respectively, they imply that a learner has to be open to new experiences, observe and reflect on experiences with multiple lenses, connect observations with the concepts and relevant theories, and adopt these theories during problem solving and decision making.

- *Learning is a holistic process of adaptation to the world*: Learning is a holistic process built upon thinking, feeling, perceiving, and behaving, which facilitates human adaptation.
- *Learning involves transactions between the person and the environment*: Experience is an interplay between subjective and objective accounts. It is the interaction of a person with the environment; a self-directed transaction between the wants, purposes, abilities, and the situation.
- *Learning is the process of creating knowledge*: The transaction of social and personal knowledge forms knowledge through learning process.

Moreover, the personality disposition (modes of relation to the world, decision making, perceiving, and judging), educational specialization (e.g., design), professional career choice (e.g., practitioner vs. academic), current job role (e.g., manager), and adaptive competencies (on tasks) determine one's learning style (pp. 114-136).

Furthermore, the theory associates diverging learners with concrete experiences and reflective observations (CE/RO), converging learners with active conceptualization and active experimentation (AC/AE), accommodating learners with concrete experience and active experimentation (CE/AE), and assimilating learners with active conceptualization and reflective observation (AC/RO) (Demirbas and Demirkan, 2007).

While individual differences are always available, the impact of education specialization in gaining specific learning modes is evident. Kolb (2014, p. 182) categorizes the orientations of academic fields, dividing them based on adopting humanities/mathematics perspectives, and their dependency on the consultancy, that is, being an applied field or not. The approach of the author depicts different professions with diverse ways of learning.

According to Demirbas and Demirkan (2007), design education empowers accommodating and converging learning styles. This means designers are generally prone to discover reality by experiencing and experimenting on the alternatives or conceptualizing based on data and experimenting with the available

knowledge. These two types of learning styles point at the concept that we know as *learning by doing*.

Supported with these studies, designers have learning modes that are compatible with embracing complex problems due to advantages of experiential learning. Designers ease complexity by making the organization familiar with the problem at hand using their methods of learning and thinking. Their experiential learning modes facilitate embracing ambiguity in a systematic way. Based on the methodology of experiencing, reflecting, conceptualizing, and testing, designers take role in the complex challenges that need exploration through learning by doing. Organizations need designers to diffuse their methods of thinking and learning, which will be explained in the following section.

3.3.2. Background on Organizational Learning

We can refer to the organizational learning theory in order to explain the increasing demand on the integration of designerly ways of learning, thinking and doing to the organizational context.

According to Brix (2017), knowledge creation and organizational learning are interrelated phenomena; they ensure strategic renewal and future survival of an organization. The author explains organizational learning to take place through a three-step process: knowledge creation, knowledge retention, and knowledge transfer. Knowledge creation happens when a member of an organization enters new knowledge to the system. The knowledge then consolidates and moves onto the members of the entire organization.

In this context, companies may create knowledge by undertaking actions such as innovation projects. Moreover, they may hire people who would add new insights to their existing knowledge. Starting with an individual, the knowledge of the individual transfers to a group/team. Overall, the change in the knowledge types of teams triggers the transfer of knowledge at a wider level, which is also referred to as organizational learning (Figure 10).

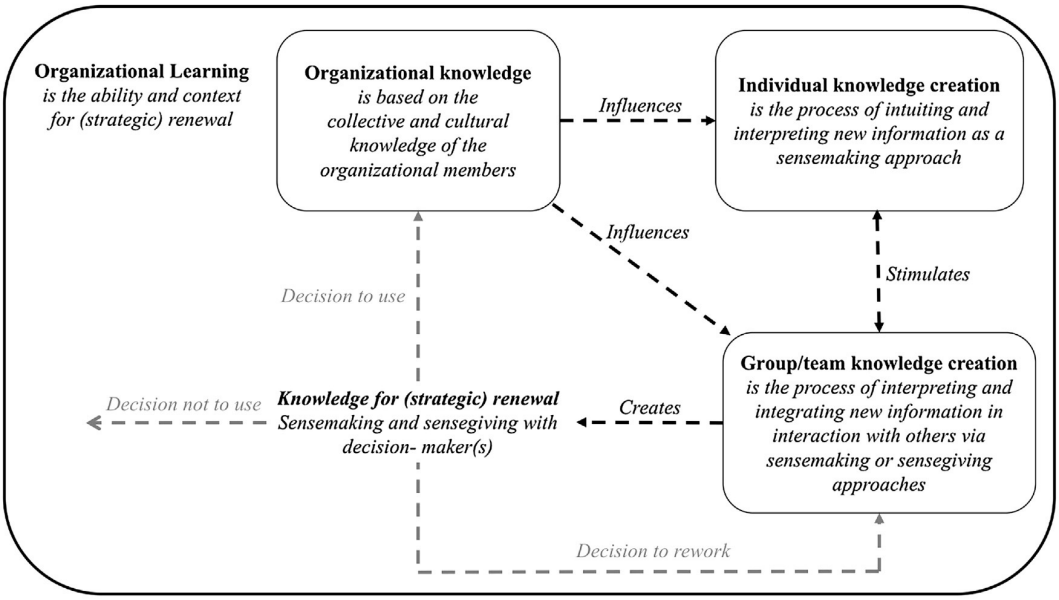

Figure 10. Framework for organizational learning and knowledge creation (Brix, 2017, p. 116).

Shown by the study of Brix (2017), organizations embrace design and innovation as a process of *knowledge creation* and *learning* through which new methods and approaches are applied by product development team members for *strategic renewal* of the company. This learning process is followed by the transfer of *knowledge* to the entire organization. Such knowledge is referred to as *organizational knowledge,* the organizations as *learning organizations*, and their learning process as *organizational learning*. In order to learn how to adapt to the rapid changes of the world, organizations need projects that increase their capabilities by expanding their knowledge and acquiring people who empower the organization by diffusing their knowledge.

The ever-increasing importance of design in the organizational contexts to adapt to the changes of the world can be explained in light of organizational learning theory. Since complex problems need alternative learning and thinking modes, designers, by being involved in the process of design, apply and distribute their modes of thinking to the design teams. Designers take several roles, while their role is empowered during the process of knowledge creation.

3.4. Conclusions to Chapter 3

New product development has been an essential strategy for companies for their survival and growth. Nevertheless, the contemporary era empowers service economy, causing manufacturing companies to search for new methodologies to catch the patterns of that day, and with a focus on human-centeredness. Along with the emphasis on human-centered innovation, and the rising complexity of problems, the conventional methods of new product development fall short in answering the demands of the current day. Meanwhile, innovation projects go beyond product development; they become a means for knowledge creation and learning for organizational survival and growth. With this interest, companies are more than concerned with incorporating approaches to lead their emerging practices. This is the point where the significance of adopting *designerly approaches* in the process of product development rises.

Design thinking, as an approach that provides means to learn, and influence corporations strategically and at an organizational level, becomes a significant approach in adapting to the changes of the world. The emergence of innovative ideas, strategies, and processes is associated with companies' ability to integrate the *design thinking* approach to the new product development process. As a result, companies have been paying attention to the methods that empower their product development teams to think like a designer.

CHAPTER 4

BOTTOM OF THE PYRAMID

Describing the background of bottom/base of the pyramid (BoP) initiatives is a necessary step to gain familiarity with the context a designer is part of. This chapter is divided into two parts in order to examine the context regarding the macro and micro scale initiatives. The first part introduces the global setting of poverty eradication strategies. It begins with the definition of poverty and the international strategies, then it describes the multi-stakeholder collaborations, and examines the business involvement and corporate social responsibility projects targeting the BoP communities. After the illustration of the global context, the second part examines major approaches in the field of design that have influenced the approaches for BoP. The chapter ends with the discussion of the role of design concerning the BoP domain.

4.1. The Background of the Efforts in the BoP Domain

The emergence of the bottom/base of the pyramid (BoP) term can be traced back to Franklin D. Roosevelt's radio speech in 7 April 1932 (Mason et al., 2013; Whitehead et al., 2014; Khadilkar, 2017b; Subhan and Khattak, 2017), expressing that a country's purchasing power depends on the forgotten men, the people in poverty, and the economy would be better only if the *bottom of the economic pyramid* is empowered. Seven decades after that, the BoP term is operationalized to describe the vast majority of the world's poor population, living in an economically disadvantaged state (Prahalad and Hart, 2002). Today, the pyramid depicts the number of people distributed according to their income and illustrates the larger share is constituted by poor communities (Figure 11) (Prahalad and Hammond, 2002; Prahalad and Hart, 2002).

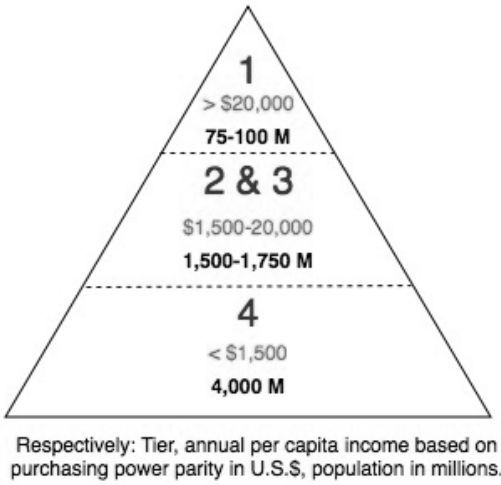

Figure 11. The World Economic Pyramid. Adapted from Prahalad and Hart (2002).

Being voiced as early as 1932, the construction of development in the BoP societies gained widespread attention in the US Marshall Plan of 1955, along with the efforts for empowering social and economic development in countries, which consumed most of their economic resources during the second world war (Coward and Fathers, 2005; Whitehead et al. 2014).

Nevertheless, it was not until the 1990s that the agenda for low-income communities gained significance again. In November 4th, 1998, African department of World Bank delivered a framework regarding the advantages of revealing Indigenous Knowledge (IK) as part of the development program. The program aimed at an exchange between traditional and global knowledge on a range of topics including medicine, agriculture and energy (World Bank, 1998a, 1998b; Gorjestani, n.a.).

By the 2000s, ending poverty in regions such as Sub-Saharan Africa and South Asia was announced as part of the Millennium Development Goals (MDGs) (United Nations, 2003). UNDP focused on guiding business strategies and launched *Growing Inclusive Markets* (GIM) reports between 2008 and 2011. A BoP summit took place in 2013 to create a business action agenda for the next ten years. By the 2000s, the strategies across the world grew with the announcement of global development goals (United Nations, 2003; United Nations, 2015;

European Union, 2016; World Bank, 2016). In conjunction with the development goals, global poverty monitoring turned into a necessary action. The following section provides an overview of the common poverty measurements, in which the BoP strategies are grounded.

4.1.1. Poverty

Poverty has been one of the most significant problems faced by humanity by carrying different peculiarities depending on the century and geography (Hulme, 2015). Described as lacking monetary resources (income and consumption poverty), basic capabilities (multidimensional poverty and human development) (Sen, 1985; 1999) or experiencing social exclusion (European Foundation, 1995), the approaches in poverty have had diverse justifications (Laderchi, Saith and Steward, 2003). Among them, the most commonly adopted approach has been the monetary approach, as it guides the strategies in poverty eradication (Laderchi et al., 2003; Hulme, 2015; UNECE, 2017).

Monetary approaches embrace poverty based on one's shortage of income or availability of costly expenditures for keeping basic standards of living (Laderchi et al., 2003; Hulme, 2015; UNECE, 2017). This perspective necessitates measurement methods in order to monitor the progress, and a threshold to compare the state of poverty. Being named as the extreme poverty line, the threshold determines the economic resources that a person needs to survive and reproduce (Hulme, 2015, p. 71). The measurement takes the basic standards of living into consideration and has *absolute* and *relative* characteristics (Hulme, 2015; UNECE, 2017).

Absolute poverty is a state characterized by being below an economic threshold, which makes it impossible to meet the basic needs, such as food, clean water, sanitation amenities, healthcare, housing, education and information, and access to the services providing them (United Nations, 1995). The measurement of absolute poverty is determined by a minimum international standard of living, the poverty line. Being first announced as $1 in 1990, the global poverty line had

been $1.25 in 2008, and $1.90 in 2015, with a declaration of 736 million people under poverty line in 2019 (World Bank, 2015). Additionally, due to varying development levels across countries, the purchasing power parity (PPP) measurement has been operationalized to compare the amount of local currency necessary to buy the same goods and services provided in the USA. Each country's poverty line is calculated by converting global measurements into local currency.

Other than absolute poverty, the need for the assessment of relative poverty emerged along with the critics regarding incapability of absolute poverty in encapsulating poverty to full extent. In comparison to the former, relative poverty is an assessment made by the members of a society about their situation (Hulme, 2015). Relative poverty is characterized as a feature depending on the development of the country and an individual's access to equal living standards. It has *objective* and *subjective* features (Van Edig, 2005; Hulme, 2015; UNECE, 2017).

For the objective poverty, there are some measurement efforts shaped on one's level of income and the position with respect to the poverty line (e.g., 60% of a country's median income) (Hulme, 2015; UNECE, 2017). However, it is a variable feature depending on the time, country, or value judgments. The measurements take the cost of basic needs into account, which can vary respective to the items on the list. The assessment always needs a reference for comparison (Van Edig, 2005; Hulme, 2015).

On the other hand, subjective relative poverty is the assessment a person makes about her/his situation in the society. It can be evaluated through interviews with people who are experiencing poverty, and the determinants may change based on the perception of the respondent (Van Edig, 2005; Hulme, 2015).

Respective to this, The World Bank's *Voices of the Poor Initiative* provides an explanation to the subjective experience of poverty, through the analysis of 60.000 interviews conducted with people in over 60 countries (World Bank, 2000; World Bank, 2016). According to these interviews:

- People experience poverty holistically both as a material and psychological state.
- Insecurity and violence are prevalent among the communities.
- People do not feel they are given equal economic opportunities.
- There is gender inequality, stressed gender relations, and domestic violence.
- People want the governments and state institutions to be transparent as corruption is a significant issue.
- NGOs are effective but not prevalently present in everywhere.
- Only informal and local entities are available to serve the needs of people in poverty.

Supported with these assessments, poverty turns out to be a holistic and multidimensional phenomenon that has many facets to consider. In line with this, there is an emphasis on holistic approaches to poverty (e.g., multidimensional poverty index; See Alkire and Housseini, 2014). However, the income and expenditure-based measurements, and the absolute and relative poverty, form common grounds to monitor the progress, and guide the policy making for poor communities (United Nations Department of Economic and Social Affairs, 2013; Hulme, 2015; Sembene, 2015; United Nations Development Programme, 2017). It should be noted that there are critics regarding the accuracy or coverage of measurements (Adler, 2015; Hulme, 2015, p. 63). Nevertheless, the measurements are influential in the formulation of the strategies, which will be explained after examining poverty in Sub-Saharan Africa.

4.1.2. Poverty in Sub-Saharan Africa

Based on the income/expenditure based models, the economic pyramid in Sub-Saharan Africa (SSA) is categorized with respect to the segments including extremely poor (destitution) (under $1.25 daily income), poor ($1.25-$2 daily income range), middle income ($2-20 daily income and $2-$4 daily expenditure range), and high-income (more than $20 daily income). Moreover, there is a *floating class* ($2-$4 daily income range), experiencing the danger of falling

under the poverty line since they are vulnerable to financial instabilities (Mthuli, Charles and Kayizzi-Mugerwa, 2011).

The interventions for poverty eradication in SSA are based on reducing the number of people in poverty. They aim at increasing access to services for education, healthcare, housing, and clean water; providing opportunities for employment, income-generation, and elongated social security. They involve cash transfers (conditional and unconditional), subsidies (agriculture, food and energy price, school feeding) and public work programs (Sembene, 2015). The interventions are formed nationally, but they are in line with the strategic vision set internationally. The international strategies are examined in the following section.

4.1.3. International Strategies for Eradication of Poverty

International organizations across the world are engaged in ending poverty by setting global strategies. In 2000, United Nations Millennium Declaration announced a 15-years agenda for global development. After this declaration, Millennium Development Goals including eight goals, 18 targets, and 48 indicators were introduced (Appendix B) (United Nations, 2003). These goals mainly encompassed:

- Goal 1: eradicate extreme poverty and hunger
- Goal 2: achieve universal primary education
- Goal 3: promote gender equality and empower women
- Goal 4: reduce child mortality
- Goal 5: improve maternal health
- Goal 6: combat HIV/aids, malaria and other diseases
- Goal 7: ensure environmental sustainability
- Goal 8: develop a global partnership for development

Although the goals were not achieved fully, it showed that a significant progress was possible especially for SSA countries with the public investment and the support of international communities (Migiro, 2007). Following the Millennium

Development Goals, on September 2015, United Nations published an agenda for sustainable development for the next 15 years (Appendix C). The agenda targeted enhancement in five folds: people, planet, prosperity, peace and partnership (United Nations, 2015). The report put an emphasis on eradicating extreme levels of poverty for sustainable development across the world. It also brought forward the necessity to protect the world from degradation, increase wellbeing to full extent, foster peace and security and ensure global solidarity, and sustain targets of the agenda with the involvement of multiple partners. Along with this agenda, 17 sustainable development goals with 169 targets and 230 indicators were announced (Appendix D).

The significance of the goals comes from incorporating the targets on poverty, inequality, climate, environmental degradation, prosperity, peace and justice holistically. Today, these goals are embraced by establishing the global multi-stakeholder partnerships given the challenges of addressing these targets alone. The following section examines the stakeholders of global initiatives.

4.1.4. Global Multi-stakeholder Partnerships for Poor Communities

In an effort to describe the multi-stakeholder partnership for the BoP, Calton et al. (2013) conceptualize the BoP as the communities who experience at least some of the challenges below:

- Low-income
- Deprived nutrition
- Scarcity of clean water
- Absence of public sanitation facilities
- Limited access to basic health services
- Informal housing
- Energy deficiency for cooking, heating, and lighting
- Limited opportunities for education, work or entrepreneurship
- Reliance on informal credits and cash

- Deprived infrastructure and absence of market network that facilitates entrepreneurial innovations
- Missing long-term investments for supporting the innovative BoP ventures
- Corruption

The actors distributed worldwide aim at addressing the challenges of BoP communities; nevertheless, in action, some of the challenges extend to:

- Poor, scarce, maldistributed, inefficiently communicated, and intensely valued information (Geertz, 1978, p. 21).
- The necessity of an added creativity for developing low-cost, quality, sustainable and profitable products and services (Prahalad and Hart, 2002).
- Embracing informal economy and deficient infrastructure (Badry, 2009).

The challenges make it hard to take action without appropriate partnerships (Rivera-Santos, Rufín and Kolk, 2012; Hahn and Gold, 2013; Hazlewood, 2015). The global multi-stakeholder partnerships take the advantage of diverse resources and capabilities that expand with the inclusion of various stakeholders (Table 7). Primary partners are, but not limited to, NGOs, civil society, business, governments and parliamentarians, international agencies, and donors (Stibbe and Prescott, 2016). Dentoni and Bitzer (2015) propose universities as the actors who need to be recognized among the stakeholders.

Partnerships happen due to enhanced sets of capabilities. A well-designed partnership benefits each stakeholder for (Hazlewood, 2015):

- Co-creation through facilitation of dialogue towards a common goal.
- Increased set of capabilities via inclusive collaboration of cross-sector actors.
- Systematic realization with a grounded plan and actions in order.
- Opening up a network which allows to transfer knowledge between the global and local partners and emerge new opportunities for action.

Table 7. Stakeholders and their resources (Stibbe and Prescott, 2016, p. 1).

NGOs and civil society	Business	Government / parliamentarians	International agencies/ UN	Donors and foundations
Technical knowledge / capacity Access to and deep knowledge of communities Legitimacy / social capital Passion and people-focus	A market-based / commercial / value creation approach Power of the brand and access to customer base Technical and process innovation Power of the value chain Infrastructure / logistics	Regulatory framework (e.g. licenses for water etc.) Integration with public systems / long term planning Taxation policy Capacity building (e.g. agricultural extension services) Provision of land and supporting infrastructure Democratic legitimacy	Technical support, knowledge and experience Legitimacy and impartiality Access to a global network Political access	Funding and support In many cases foundations can be less risk adverse and support more experimental and innovative approaches, providing proof of concept that can be expanded by more traditional donors

The recognition of the mode of collaboration, and contribution is necessary for a well-designed partnership (Nobre and Morais-da-Silva, 2018). In a report by Global Business Network, the stakeholders of the BoP initiatives are grouped under seven categories (Boyer, 2003, pp. 5-6):

1. Corporate pure-play experiments: For-profit business partners.
2. Catalysts and enablers: "Middleware" of BoP actions which involve academic institutions, think tanks, foundations, NGOs, financial organizations and consultancies.
3. Social entrepreneurs: Mostly non-profit (i.e., for benefit) actors such as startups funded by government or other institutions.
4. Multilateral institutions and development agencies: The governmental actors which fund activities for the creation of a market. The examples are World Bank and UNDP.
5. Advocates: The actors who are effectively acquainted with the issues of the BoP communities. The examples include NGOs, social activists, citizens and religious groups.
6. Corporate philanthropy: Mostly comprises the donations made to promote welfare of a society.
7. Transnational networks: The distributed network for connecting local agents to the global context.

Despite the richness of actors, an effective collaboration is a challenge given the difficulty of the management of multi-stakeholder partnerships. Although the necessity of multi-stakeholder partnership is frequently voiced, the reports on them introduce a number of social, motivational, moral and governance-related challenges. For Hazlewood (2015), the challenges are:

- Rigid and inflexible top-down procedures of funding.
- Cross-sectional approaches missing the opportunity of a systemic change.
- Insufficient effort to create an infrastructure for the management of complexity.
- Lacking rules that govern the way a business operates transparently.
- Unequal contribution of local and global stakeholders.
- Deficient monitoring and evaluation of the progress for learning purposes.

Another research by Stibbe and Prescott (2016) reports the difficulty of the management of cultural differences, approaches, values, interests, and terminologies, and ineffective partnering as the challenges to be overcome. These challenges appear as obstacles against effective collaborations.

In ensuring an effective collaboration, the first step is finding the right collaborator; each stakeholder needs to commit to the collaborative process, and should have credible, neutral, and trustworthy qualities. Besides, the clarification of the goals is of crucial importance in the successful engagement of stakeholders; the goals, scope and context, roles and responsibilities, timelines, and rules need to be clear (National Round Table on the Environment and the Economy and Public Policy Forum, 2010). The survival rates of collaborations can be increased through *business intimacy*, *mutual value creation*, or *business friendship* (Gutiérrez, Márquez and Reficco, 2016). In addition, the involvement of the actors and the strength of the collaborations need to be formulated depending on the target of the collaboration (e.g., familiarization with the context or having an elaborated knowledge for acting) (Badry, 2009). While doing so, the *social*

embeddedness[1] turns out to be an effective feature as a vital aspect that influences the way in which collaborations are formed (Badry, 2009).

As shown, global multi-stakeholder partnerships incorporate business actors for their power in establishing the value chain with their technical and process innovation skills. It is also worthwhile to examine the objectives of business actors concerning the BoP domain.

4.1.5. Business Actors

Business creation at the BoP societies is an effort initiated by private actors (Rivera-Santos, Rufín and Kolk, 2012; Hahn and Gold, 2013). It contains the partnership of commercial stakeholders (i.e., local suppliers, customers, and local entrepreneurs), non-commercial stakeholders (i.e., civil society; community groups, and NGOs), and public sector stakeholders (i.e., local governments),

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1 Badry (2009) explains that an effective partnership of multinational companies in low-income markets depends on the social embeddedness, having relational (tie) and structural (strength) dimensions. From the author's view, social embeddedness refers to the social relationships a member of a community holds with members of another. Therefore, in establishing an effective network, one's connection to the targeted community is an important concern.

Based on the concept of social embeddedness, Badry (2009) discusses that the actors of low-income networks are in stronger or weaker social connections (ties) with each other. This state necessitates the identification of the collaboration type for effective partnerships. The author differentiates the collaborations to take place in the form of public-private (i.e. between business and government or civil society), between-private sector, and cross-sector partnerships (i.e., between private business, public and civil society), all of which needing to be treated differently.

In this regard, the author proposes the exploration-exploitation framework for explaining the commercial partnership strategy of multinational companies in the low-income markets. For an effective partnership, relational and structural characteristics of the framework domains should be utilized considering the goals (i.e., social exchange) and the characteristics of the partnership (i.e., stakeholder vs. non-commercial partnership).

In the same study, the author categorizes an exploration initiative as a process in which stakeholders aim to create a broad understanding about the domain. This process can be carried out by connecting (in weaker ties in commercial, stronger ties in non-commercial partnerships) with as many actors as possible, helping to depict the bigger picture with explicit knowledge in a short period of time. Nevertheless, data accumulation is so high that the organization needs to handle information noise. Whereas, in an exploitation initiative, the organization seeks tacit and elaborated knowledge to refine and build up on the existing information for improvement purposes. In this regard, stronger ties are needed to establish a network among stakeholders. Moreover, only trustworthy relationships facilitate social exchange in partnerships with stronger ties. Although, this study does not answer how cross-sectoral partnerships should take place, it recommends having stronger ties for building trust and familiarization with other stakeholders.

distributed globally and locally (Badry, 2009; Rivera-Santos et al., 2012; Stibbe and Prescott, 2016).

Given the challenges of entering the BoP market, the involvement of multinational corporations depends on the creation of synergistic opportunities. According to Del Baldo (2013), business stakeholders benefit BoP communities through:

- Addressing the basic needs of the BoP,
- Increasing productivity by building an infrastructure for business-making,
- Forming up new jobs that create income and sustain the real income with the help of low-cost products, and
- Enhancing people's sense of control over their lives by supporting their income generation while creating new markets.

Concerning the opportunities of MNCs, almost two decades ago, Prahalad and Hart (2002), who are the pioneers of MNC involvement in the BoP challenge, identified the opportunities at the BoP markets as:

- Ease of fostering awareness about products and services thanks to communities' media access,
- Increased demand on the multinational corporations due to gradual withdrawal of aids and governmental support,
- Competitive advantage due to entering the underserved BoP market,
- Facilitation of development with products and services for people in rural areas in order to discourage migration.

Commenting that the inquiry into the motivation of companies for entering the BoP market is not sufficient, Sharma and Hart (cited in Jagtap and Kandachar, 2009) count the saturation of technology, and slow market growth among the reasons the companies are motivated to enter the BoP markets. Keating and Schmidt (2008) express that the opportunities go beyond financial, strategic, and philanthropic gains; the secondary benefits are leveraged employee skill set and wellbeing, positive company image, and the spread of innovation culture in other

departments of the company. Similarly, Del Baldo (2013) summarizes the opportunities as:

- New markets: Entering new markets with growing population and increasing incomes.
- Enhanced reputation and PR: Building trust among the BoP society and stakeholders.
- Employee retention and training: Empowering employees' personal development process by building skills, which increase positive identification and engagement with the company.
- Innovations and the capacity for innovation: Empowering innovative capabilities through application of novel methodologies in the design of products that lead to market survival and growth in the long-term.

Once recognizing the commercial entities among the stakeholders of poverty eradication, it becomes apparent that the business has to approach the problem domain in a responsible way. The next section explores how BoP product development projects are formulated.

4.1.6. Corporate Social Responsibility

Almost seven decades ago, Bowen (1953, p. 6) described social responsibility in business as "obligations of businessmen to pursue those policies, to make those decisions, or to follow those lines of action which are desirable in terms of the objectives and values of our society". Once perceived as an obligation to the society, the definition of CSR has expanded through years from an ethical perspective alone to a perspective that extends to all stakeholders with various ethical, societal, environmental, and business-related considerations (Rahman, 2011). Carroll (1991), with his notable CSR pyramid, pointed at four aspects in CSR: economic, legal, ethical, and philanthropic.

Today, CSR approaches empower transparent and ethical decision making such as the assessment of the impact on the planet, people, and profit. Also known as the

triple bottom line (TBL), indeed, CSR ultimately aims at the transformation of capitalism to a holistically responsible state (Elkington, 2018).

While CSR is widely accepted as a tool to gain awareness and assess a company's impact on stakeholders, contemporarily, multiple pragmatic perspectives are incorporated to the phenomenon of CSR; from positive corporate/brand image and reputation (Kumar, 2013; Ozdora-Aksak, et al., 2016) to employee organizational commitment and organizational performance (Ali et al., 2010), value creation (Gholami, 2011), encompassing societal interest of internal and external stakeholders into business actions (Freeman and Dmytriyev, 2017), and organizational learning (Antal and Sobczak, 2004; Von Weltzien Hoivik, 2011). As Preuss (2011) states, the advantages of CSR projects are beyond social benefits; CSR projects are open grounds to increase competition, reduce cost and risks, improve reputation and legitimate and synergistic value creation in the scope of innovation. He identifies four CSR innovation project categories by extending the innovation framework by Francis and Bessant (2005) as:

- CSR P1 innovation in CSR project content: CSR project to create a social and environmental change; e.g., design for environment, sustainable design, or design for the BoP.
- CSR P2 innovation in CSR processes: CSR to change conventional business processes; e.g., the addition of open innovation to the business agenda.
- CSR P3 innovation in CSR positioning: CSR project to position the firm to a responsibly aware state.
- CSR P4 innovation in the CSR paradigm: CSR projects that are able to change the expectations from CSR by integrating CSR to the business case; e.g., establishing institutions for family-care of the firm's community.

The potential of CSR for sophisticated objectives such as knowledge creation and organizational learning is apparent. Moreover, as illustrated by Preuss (2011), innovation and CSR can be embraced together to increase the competitive existence of a company. This empowers CSR projects for the opportunities they

pose for the BoP domain. The number of CSR projects concerning the BoP communities is in line with this (Davey et al. 2005; Preuss, 2011; Rexhepi et al., 2013; Shyama et al., 2014; Jamali and Karam, 2018). Therefore, CSR is gaining significance in addressing challenges such as designing for the BoP communities. With its integrated advantages, it offers a means to compete, engage stakeholders, create knowledge and learn, and even transform the way business making happens.

This section depicted the context of efforts for the BoP communities. It introduced the monetary poverty approach that has been utilized to guide the social development policies. Respectively, it showed the strategies, goals and targets, multi-stakeholder partnerships to address the challenges in a collaborative way, business actors among the partners of poverty eradication stakeholders, opportunities projected for business stakeholders in the BoP markets, and the way CSR projects are operationalized for the BoP product development. The next section presents the new product development considerations for the BoP communities.

4.2. New Product Development for the BoP Communities

This section reviews the considerations in new product development for the BoP communities. Then, it provides new product examples that aim to leverage quality of life and wellbeing of the BoP communities.

Offered first by Anderson and Billou (2007), through years, the widely adopted perspective has been 4As -acceptability, availability, awareness, and affordability- of products/services for the success of organizations in the BoP domain. They associate the terms with the following qualities:

- Availability: The prevalence of channels which ensure that a product penetrates into the context of BoP communities in a widespread way.
- Affordability: The extent to which BoP communities can afford the expense of a product or service.

- Acceptability: The level of which products are in line with the people's needs and the characteristics of the unique context.
- Awareness: The degree to which the BoP is familiar with the product.

While this perspective serves as a tool to assess the success of organizations, further research has been carried out in order to guide the new product development process in a successful way. Castillo et al. (2012) provide four dimensions for product assessment. These are viability, feasibility, sustainability, and desirability of products. This perspective blends users' desires, technology capabilities, financially viable business plans, and impact assessments on the TBL in order to generate integral product development strategies for the BoP communities.

Seeing that product success is beyond product qualities, through the review of considerations for the BoP, Jagtap and Kandachar (2009) incorporate two more dimensions to the 4As. These are stakeholder engagement and economic self-sustainability, which respectively mean managing the needs and expectations of stakeholders and sustaining the business in the long term.

In fond of the assessment of product qualities via systematic methods and tools, Whitehead et al. (2016) identify eight product design dimensions through the analysis of products in the BoP market:

- Affinity: The degree to which the product establishes an emotional bond with user.
- Desirability: The way the product creates an aesthetical appeal.
- Repairability: The degree in which the product is designed to have repairable parts.
- Durability: The level of robustness that a product needs to survive in harsh conditions.
- Functionality: Functional attributes that a product possesses.
- Affordability: Availability of alternative methods for providing affordable payment options.
- Usability: Usable product features and representations designed in a human-centered way.

- Sustainability: The extent to which the product material is chosen in an environmentally sustainable way, and the distribution channels of the product is sustainable.

While these considerations are still being explored, they serve as assessment criteria to be utilized during new product development processes. Moreover, they point at strategies to be developed in a human-centered and contextually informed way. Furthermore, the wide range of considerations show that the new product development success is beyond product qualities and extends to the inclusion of multiple stakeholders effectively in the process. The following part provides seven product examples that successfully survived in the long-term. The products address communities' basic needs around water transportation and filtration, food preservation, and eyesight improvement.

4.2.1. Qdrum

Qdrum is a rollable cylindrical plastic container designed in South Africa (Figure 12). It holds up to 50 liters of water and is made of linear low-density polyethylene (LLDPE). The product is introduced based on its advantages that ease storage and transportation. The product aims to solve injuries caused by heavy loads on the head while carrying water from resource to home while offering durability and ease. The webpage of the product explains that some users cannot afford buying qdrum due to high manufacturing costs, hence, they are in search of strategic partnerships and collaboration channels to decrease the costs. Other use cases of the product range from camping to military, agriculture, mining, harbours and marina, natural disasters, and aid. The price in 2018 is 1120 South African Rand (approximately 79 USD). The product won award at Rolex Awards in 1996 and Well Tech Awards in 2008, and it was exhibited at the National Design Museum of New York as part of Design for the other 90% exhibition in 2007, Science Museum Exhibition in 2008, International Design Biennale in 2010, and Design Real-Serpentine Gallery between 2009 to 2010 (qdrum, 2011a, 2011b, 2011c).

Figure 12. Qdrum. Retrieved from https://www.qdrum.co.za/image-gallery?func=viewcategory&catid=7.

4.2.2. Hipporoller

Being very similar to Qdrum, hipporoller was designed in South Africa by Pettie Penzer and Johan Jonker in 1991. The product is made of UV stabilized linear low-density polyethylene and electroplated mild steel. Besides advantages in effectiveness of water carriage, it is especially designed for durability as the context of use is challenging with uneven gravel surfaces, foothpaths, sharp stones and hilly terrains. The price is approximately $125.00. The firm mentions that one product has a lifespan of 5-7 years and can be shared by neighbors. The webpage of the product declares that the product design is convenient for the addition of filtering and disinfection technologies, and collaboration for product's integration to a systemic level initiative is planned for this purpose. The product won SABS Cullinan Design Award (1992) and Design for Development Award (1997), and African Rural Portable Water Solutions Product Leadership Award in 2016 by Frost&Sullivan. It was nominated in INDEX 2005 in Denmark. The product was exhibited in AIDF, Washington DC, Cubes of Ideas in Barcelona, Museum of Design in Atlanta, Roca London Gallery, and World Water Forum in Marseille (Hippo roller, 2018a, 2018b).

Figure 13. Hipporoller. Retrieved from https://www.hipporoller.org.

4.2.3. Mitticool

Mitticool is an eco-friendly refrigerator targeting people with no access to electricity. It was designed by an Indian innovator Mansukhbhai Prajapati. Made of terracotta clay, it works with the principle of evaporation and does not need electricity to run. The users are expected to fill the water tank with water on a regular basis. Being first introduced to markets with low income, currently, it is sold across the world through e-commerce websites from 10,000 indian rupee (approximately 138.51 USD). The product received more than 80 awards and invitations between 2003 and 2018 (MittiCool, 2018a; 2018b; 2018c).

Figure 14. Mitticool Clay Refrigerator. Retrieved from https://mitticool.com/product/mitticool-clay-refrigerator50-liter/.

4.2.4. Chotucool

Chotucool is a customizable, portable, compact and energy efficient food preservation box, which operates on electricity and drops internal temperature 28 degrees from the ambient temperature while retaining cooling for three hours without electricity. The product is available in solid colors, traditional patterns and customizable graphic designs. The product webpage indicates that the product development strategy is disruptive innovation, and it allows to reach new users that were unreachable earlier. The team describes the primary principle of this strategy to be the analysis of Indian people's needs and getting inspiration from their needs to create products that can trigger a change in people's *living standards, livelihood and lifestyle*, which they regard as 3L vision for inclusive business. The product received Edison Award in April 2012, Business Standard Award in March 2011, Infosys Innovating for a Better Tomorrow Award in April 2012, and Yi Next Practice Best Innovation Award in November 2012 (Chotucool, 2018a, 2018b, 2018c).

Figure 15. ChotuKool. Retrived from https://www.chotukool.com/frmbuy.aspx.

4.2.5. Lifestraw

In 1991, a Swiss company Vestergaard developed a filtering cloth that could remove Guinea worm larva from water as a corporate responsibility project. The company designed their first product LifeStraw, targeting people without clean water access in developing countries. In the following years, the company worked on products that could filter most of the unsafe microbiological contaminants that transmit waterborne diseases such as typhoid, cholera, dysentery and diarrhea. Again, in time, the company increased the range of products from personal pipes to community storages to keep larger volumes of water. Now the company offers several models with filtering technology for addressing mostly the needs of European users hiking, backpacking, camping and travelling. And an amount of LifeStraw product family sales goes toward the purchase of community purifiers (storages with filters) for providing children clean water (LifeStraw, 2018a, 2018b).

Figure 16. LifeStraw products.

4.2.6. Adspecs

Joshua Silver, being a physics professor based in United Kingdom, started working for eye-correction with liquid filled eyeglasses in the mid 1980s and established Centre for Vision in the Developing World that works on donations. Silver innovated Adspecs, low-cost self-adjustable glasses, grounded on self-refraction approach. He targeted school-aged children in developing countries. Self-adjustability in glasses is ensured via turning the wheels on the glasses' arms to pump silicone oil into the lenses. Flexible membranes allow the lenses to change shape so that the owner can adjust the lenses until having a perfect sight. Currently, the center works on scalable and sustainable business models that would penetrate low-cost adaptive glasses amongst people with visual impairment. The center declares the product's potential as bringing multiple actors ranging from entrepreneurs to humanitarian organizations together for the development of vision solutions. Silver and his team raise research questions on their website regarding improvement of their product's user experience and socio-technical issues (Centre for Vision in the Developing World, 2018a, 2018b).

Figure 17. Adspecs glasses. Retrieved from https://drjamesmcardle.com/2013/05/01/silver-eyes-see-for-yourself/.

4.2.7. One Laptop per Child

One laptop per child is a collaborative project aiming to empower poor children by providing them low-cost, low-powered, and connected laptops which last approximately four years (Figure 18). Having more than a hundred stakeholders in action, the project runs on donation. The project has been evolving with the improved versions of the well-known xo laptop, being nl3 and infinity laptops aimed for better performance and usability (OLPC, 2018).

Figure 18. OLPC xo laptop.

New product development for the BoP communities is not an easy task given that products need to fulfill the expanding set of dimensions provided at the beginning of this section. The product examples, some of them with a history of almost three decades, are still under progress with the exploration of new funding channels, business models, and research and development of new technologies and materials. Moreover, their impact is prone to their capacity in bringing multiple partners effectively together. This is an indication that the product development for the BoP communities is still evolving; it is a learning process depending on the knowledge accumulated with the efforts of the initiatives. New approaches, built on the insights of this learning, are necessary to guide the BoP domain. In parallel to this, the BoP vision is also under transformation. The next section shows the progress of the BoP model.

4.3. The BoP Model Under Transition

An early BoP model, introduced by Prahalad and Hart (2002), proposed there are 4 billion people who depend on a daily income of $2 or less, forming the fourth tier of the world economic pyramid (See Figure 11 on p. 56). The authors demonstrated that the underserved BoP communities, who constitute two thirds of the world's population, form a profitable market for multinational companies. They pointed at the gap in product development for people with low-income. This approach offered a perspective that existing products with their price points reduced, could be served through expanded distribution channels to poor communities (Hart, 2015).

The first BoP model was criticized for being another form of imperialism (Karnani, 2006), decolonization (Faria, Hemais and Cooke, 2014), and capitalist hegemony (Montgomery, Peredo and Carlson, 2017). Evidencing that the market was considerably smaller than it was suggested, and that there is a risk to mistake the emerging middle class with the BoP, Karnani (2007, 2009) objected to Prahalad's formulation of the BoP.

Upon the criticism, co-creation of value with BoP communities gained significance. Prahalad and Ramaswamy (2004) argued about the importance of co-creation in the business setting. According to the authors, "the meaning of value and the process of value creation are rapidly shifting from a product and firm-centric view to personalized consumer experiences. Informed, networked, empowered and active consumers are increasingly co-creating value with the firm". In the meantime, by naming the model offered by Prahalad and Hart (2002) as BoP 1.0, Simanis and Hart (Simanis et al., 2005; Simanis and Hart, 2008, 2009) continued to study a compromising, second-generation strategy (BoP 2.0) based on mutual value creation. They reframed the aim from selling products to engaging BoP communities in the business process. They conferred to the necessity of value creation for all partners involved and offered business co-venturing as a crucial step to dissolve the conflicts. From this perspective, a company's strategies had to benefit both ends; they needed to co-create businesses with the BoP communities.

On the contrary, Karnani (2007, 2009) argued that multinational companies should see the BoP communities as producers instead of customers to avoid exploitation. Moreover, he opposed to the "value conscious consumers" and "resilient and creative entrepreneurs" formulations for not taking into consideration the roles of social and entrepreneurial aspects. For the societal aspects, he presented two main drawbacks against the idea of the poor being "value conscious consumers". The first one was the poor being vulnerable to manipulation for consuming more. In a study by Banerjee and Dufflo (2007), the poor are shown to be tempted to spend more on entertainment instead of primarily covering basic needs. Besides, the tendency to fare better than their peers (e.g. neighbours) form their motivation of consumption, could result in the exploitation of the poor. Based on this, providing increased consumption means would harm the BoP since they will be willing to spend more while they may not be reasoning the consequences due to lacking education Karnani (2007, 2009).

Moreover, for the concerns about entrepreneurship, Karnani (2009) argued that people at the BoP work as self-employed. They cannot be seen as entrepreneurs since their means of economy is neither sustainable nor creative. He also

criticized the BoP theory on grounds of exclusion of the governments for providing employment opportunities to the BoP. From this perspective, the BoP approach failed at explaining the role of governments and it overemphasized the importance of the corporate sector for ending poverty.

Again, in response to the criticisms, the protocol has been further explored with version 3.0, demonstrating a shift from seeing the BoP as customers to entrepreneurs and creative innovators (Dembek, Sivasubramaniam and Chmielewski, 2019). Given that the underdeveloped economies do not have the necessary skills for designing convenient products, and the contextual and financial constraints influence their capabilities, the BoP 3.0 version aims to empower communities concerning their sustainable development. Hart (2015, pp. 2-4) points the differences between BoP 2.0 and BoP 3.0 as follows:

- **From protected space to purpose and mindset:** BoP 2.0 supported companies to give BoP ventures time and space for co-creation. With BoP 3.0, however, the purpose and mindsets of BoP are emphasized to be internalized at a corporation level.
- **From co-creation to open innovation:** BoP 2.0 emphasized the importance of co-creation and the bottom up partnerships with the people. While effective partnerships and mutual value creation for all is still under exploration, new directions such as open innovation can be the source of novel opportunities.
- **From stand alone to innovation ecosystem:** BoP 2.0 acknowledges the importance of the stakeholder engagement, yet, the strategy, price points, business model, and value proposition determine the success or failure of the BoP venture. BoP 3.0 model, on the other hand, incorporates the venture as part of a larger innovation ecosystem, where the stakeholders act together.
- **From extended distribution to innovation for the last mile:** While BoP 2.0 underlines the necessity of effective distribution channels that extend to rural areas, BoP 3.0 highlights complementary partnerships covering areas in a creative way.

- **From NGO engagement to cross sector partnership networks:** BoP 3.0 stresses sophisticated partnerships of companies and NGOs, governments, academic partners and other key players in the distributed regions.
- **From poverty alleviation to sustainable development**: BoP 3.0 business logic, with an emphasis on TBL, serves as a learning process to nurture new models to address not only for BoP communities but also underserved people in the developed world.

As illustrated, the BoP vision has been in transformation (Hart, 2015; Hart et al., 2016). While the original incentive for BoP business was using the power of companies to serve people in poverty, the vision evolves with respect to the complexities of making that happen. The following table shows the transition in the BoP vision.

Table 8. Transition in the BoP vision (Adapted from Dembek et al. 2019, para. 13).

BoP 1.0	**BoP 2.0**	**BoP 3.0**
BoP as consumer	BoP as business partner	BoP as small producer
Deep listening	Deep dialogue	Ad hoc process, cross-sector partnerships, and networks
Reducing price points	Expanding imagination	Immediate value appropriation by BoP small producers for products and services
Redesign packaging, extend distribution	Marry capabilities, build shared commitment	Shared skills and knowledge appropriated by small producers
Arm's length relationships meditated by NGOs	Direct, personal relationships facilitated by NGOs	Direct relationships with stakeholders by the BoP small producers initiative
Selling to the Poor	Business co-venturing	Sustainable development, bottom-up model

Currently, several scholars explore diverse strategies concerning the opportunities they might create in the BoP domain. The discussions are rooted in contemporary social models, and emerging technologies. For instance, Darwish and Van Dyk

(2018) propose the *BoP 4.0* concept for utilizing the *Industry 4.0* ecosystem to increase the entrepreneurship capabilities of people living in rural Africa. Moreover, there is an ongoing discussion regarding the benefits of adopting circular economy, open design, and do-it-yourself approaches in the BoP models (Majumdar et al., 2016; Diehl et al., 2018).

As shown in this section, the BoP model is under transformation. It has evolved from seeing the BoP communities as consumers, to business partners, and now as producers. Moreover, contemporary social and technological approaches are tested for their potential of creating impactful BoP strategies. This tendency results in continuous exploration and increases the role of design related perspectives to empower the domain. The next section explains the role of design in transformation of the BoP initiatives.

4.4. Diffusion of Design Approaches into the BoP Domain

Designing for the BoP communities has always been at the intersection of multi-faceted debates concerning society, economics, ethics, and convenient industrial design approaches. In fact, the discussion dates back to the 1970s, when *industrial design* was acknowledged as a powerful source for national development and quality of life by International Council of Societies of Industrial Design (became World Design Organization in 2017) and United Nations in 1979 (Er, 1997; Coward and Fathers, 2005; Whitehead et al., 2014).

In this period, responsibility was issued along with the increasing power of industrial design and the field's contribution in escalated commercialization. In these years, Papanek introduced a pioneering vision in his book "Design for the Real World" (1971), where he challenged designers to embrace product development in a more responsible way, by considering the *real* needs of people in poverty, and not creating artificial wants aimed at increasing profits of commercial ventures.

The responsible design vision raised in these years coincides with the inquiry into the convenient design approaches for underdeveloped communities. In pursuit of

such an approach, an economist, Schumacher (1973), introduced Appropriate (Intermediate) Technology term in his seminal book *Small is Beautiful*. The concept was going to gain popularity in leading the development of affordable, simple, small-scale, creative, environmentally sustainable products for underdeveloped societies (Pursell, 1993, p. 632). Despite the excitement it created among the private enterprises, appropriate technology movement was going to fail due to missing the realities of the market (Polak, 2010).

Nevertheless, private entities' widespread interest in product development for underdeveloped communities revived again by the 2000s. Starting with the announcement of millennium development goals, and followed by the discussion raised by Prahalad and Hart in 2002 about the poor communities no longer being seen as victims but as consumers who need tailored approaches, the involvement of the MNCs in the BoP challenge gained attention. They identified four billion people living with less than $2 daily income and showed the gap in product development for poor communities, forming a profitable market for multinational companies. In the same year, Margolin and Margolin (2002) discussed the barrier in Papanek's (1971) vision, caused by the division of commercial market and design. They rejuvenated the necessity of a social model, aiming to balance designing for market and human needs.

Upon the rising interest of the MNCs into the BoP challenge and the failures business actors had experienced, the critics grew around the idea that there was a fortune at the BoP. Through these years, the critics pointed at the necessity of putting human needs responsibly at the core of initiatives (See Section 4.3).

In parallel to these discussions, partnerships/collaborations of companies and design schools turned out to be a crucial element of BoP product development projects. For instance, between 2009-2011 in Delft University, several student projects, rooted in the millennium development goals, took place under collaboration of industry, entrepreneurs, NGOs, and in some cases with the BoP communities (See Kandachar et al., 2009a; Kandachar et al., 2009b; Kandachar et al. 2011). Moreover, a considerable amount of academic progress including books (e.g., BoP section in Van Boeijen et al., 2011), and conferences were achieved

(e.g., Impact of Base of the Pyramid Ventures Conference in Delft). Additionally, the gaps in the literature were identified upon the call of Kandachar and Halme (2007a). These gaps were in 1. understanding the needs of the poor people by engaging them in the BoP product and service development process, 2. available assessment methodologies and their efficiency in understanding the needs of the people, 3. sustainability driven approaches for alleviating with poverty, 4. potential "bottom-up" innovation modes for the BoP initiatives, 5. potential complementary or disruptive approaches substituted for the BoP model of development, and 6. the discussions on corporate responsibility and ethical barriers of neo-colonialism.

In this period, with constant failure of embedding user-centric perspectives into the BoP product development process, both academic and practitioner circles carried out exploration about how human-centered product development could be facilitated. Also, in line with this, upon the request of Bill & Melinda Gates Foundation, IDEO focused on toolkit development for designers and non-designers in order to guide their BoP efforts in a human-centered way (Brown and Wyatt, 2010). Right after, IDEO introduced the *Design Thinking* concept and *Human-Centered Design* (HCD) toolkit for the BoP interventions (Brown, 2008; Brown, 2009; Brown and Wyatt, 2010; IDEO, 2015; IDEO.org, 2015). The firm released a toolkit named *Design Kit Travel Pack* through crowdfunding in 2017 (Kickstarter, 2018). Moreover, in the last years, the firm has been partnering with an online training platform to gather BoP practitioners together and train them as *human-centered designers* for applying design thinking methodologies and relevant skills in the BoP problem context (See +Acumen, 2019). Upon these efforts, IDEO has been recognized as an influential actor with the approaches and toolkits tailored to examine the needs and problems of the BoP communities around business circles, supported with the attribution of *design thinking* to IDEO.

The popularity of the design thinking approach for embracing complex problems, and the attention raised by reputable institutions such as d.school in Stanford and Potsdam (See Section 3.3. Design Thinking for Organizations), resulted in the dissemination of designerly methods of thinking and ideating. This state

empowered the demand on learning through open-access teaching modules. The Design Exchange project led by UC Berkeley and M.I.T. is an example of this.

Moreover, similar to IDEO, in the last years, there has been a steep increase in the number of enterprises, and design consultancies, focusing on designerly methods and toolkits for embracing the complex problems, and disseminating their perspectives (Collective Action Toolkit by Frog, 2012; Design Thinking by Vianna et al., 2012; 3P4PPI model by Chevrollier and de Vogel, 2013; Spring Accelerator by Fuseproject, 2016; designabetterbusiness.tools, 2019). Moreover, design consultancy in the domain of BoP has been on the rise (Continuum, 2014; Doblin, 2016; Proximity Designs, 2019; Elephantdesign, n.d; Development Impact and You, n.d.). As a result, designerly approaches are made easier for businesses to apply; the actors are encouraged to try contemporary methods to designing products and services.

Indeed, the abovementioned developments were in parallel to the discussions in the academic circles that have shaped the new product development practice of companies. Moreover, the approaches in the literature varies from user-centered to holistic directions. In the following, the approaches are summarized.

Emphasis on user/human-centeredness:

Despite the economic constraints and limited accessibility, user research and relevant approaches gained significance in the context of BoP product development efforts (Kandachar and Halme, 2007b; Polak, 2008; Thandapani and Woodbridge, 2011). This state empowered the necessity for the development of effective design and research methodologies for the BoP. In the meantime, the exploration onto *designing with the BoP* communities gained significance as much as *designing for the BoP* communities (Kandachar et al., 2011).

Moreover, under the influence of human-centeredness, the exploration of methods and tools, frameworks, and roadmaps for the design and assessment of new products gained significance (Rodríguez et al., 2006; Kandachar and Halme, 2007b; Jiang and Kandachar, 2009; Jiehui and Kandachar, 2009; Van Boeijen et al., 2011; Castillo et al., 2012; Whitehead et al., 2014, 2016; Emili et al., 2016).

Emphasis on holistic and systems-level perspectives:

The necessity of holistic approaches in practice has been apparent from the moment researchers exhibited a relationship between the BoP domain and systems-level thinking (Aranda-Jan et al., 2016; Ceschin and Gaziulusoy, 2016; Khadilkar, 2017a, 2017b). The body of research highlights the need of using systems level and further socio-technical perspectives (Jagtap, 2009; Jagtap and Kandachar, 2010; Sovacool et al., 2011).

Additionally, the potential of wellbeing driven (i.e., capability approach) perspectives for the BoP communities has been investigated by several scholars (Ansari et al., 2012; Kandachar, 2012; van der Marel, 2012; Mink, 2016). These approaches delve into the problem in a holistic way, as they intend to address the inner needs and values of people by building capabilities.

To sum up the efforts, the BoP domain is in need of knowledge to guide the ventures effectively, and ultimately aims to evolve in order to respond to the needs of all stakeholders. The approaches, methods and toolkits offered by design communities serve as a basis to guide the new product development process of companies in light of the contemporary formulations of BoP.

4.5. Conclusions to Chapter 4

Global development strategies have been playing a vital role in taking steps towards sustainable development. Although there is a progress, poverty still remains to be the greatest problems faced by humanity. Income/expenditure-based method of analysis, which is core to the development of concrete strategies, has limitations for representing poverty as whole. In this regard, new conceptual definitions are made based on holistic and multidimensional approaches.

There are several initiatives to eradicate poverty on grounds of the global strategies. Starting with their benefits to the global multi-stakeholder partnerships, MNCs gradually play more roles with PSS innovation for uplifting the quality of life and wellbeing of the BoP communities. They apply their knowledge for taking solid steps by establishing value chains, exerting knowledge for

innovation, and building an infrastructure that extends to BoP users. Nevertheless, their efforts, once rooted in market knowledge, is also prone to change with an emphasis on the human-centeredness for successful implementations.

These global tendencies point at the necessity of a change in the vision, empowering the actors of design. While academic circles are in search of directions that would benefit the domain of the BoP around human-centeredness, holistic thinking and transformation, practitioners are making it easier to transform business making with the BoP by spreading their human-centered visions and perspectives.

4.6. Conclusions to the Literature Review

Chapter 2 investigated the roles, skills, and workstyles of designers in the 21st century, concerning complex problems, and the world in transformation. Chapter 3 covered the fundamental approaches of NPD and provided designerly approaches that transform the way NPD happens. Finally, Chapter 4 reviewed one of the complex problems, designing for the BoP communities, and explored the influence of design in embracing the domain under transformation.

The literature review shows that the transition in the world as a whole increases the role of design as a method of learning and doing to embrace complex problems of the new era. The role of design and the designer are empowered concerning the transformation in the world, new product development approaches to respond to the transformation and the complex problems in which learning is acquired. Human-centered perspectives, responsible and holistic approaches, problem-solving competencies for embracing complexity, and mediating multi-stakeholders in a collaborative manner are emergent approaches that bring designers, new product development, and the BoP domain together.

Nevertheless, despite the indications, there is no specialized approach to the roles and skills obtained through the analysis of the NPD processes for the BoP communities. This gap is to be filled with this research.

CHAPTER 5

METHODOLOGY

Showing that the products are the end results of new product development processes with methods (See Chapter 3), design for the BoP domain increasingly benefits from design approaches (See Chapter 4), and there is a contemporary request on designers to incorporate their designerly ways of thinking and doing into these processes (See Chapter 2), it is apparent that there is a need to examine how a *process* shapes a product, and how a designer *influences* the way it is shaped for the BoP. However, such an examination requires a subtle methodology design as the research has to reveal the dynamic relationship between the researcher and the researched phenomenon. Hence, acknowledging the key points that lead to good research is significant for this type of inquiry. With this purpose, this chapter explains the fundamental principles of research and presents the research design based on them.

5.1. Research Paradigms

Research paradigms offer shared principles that impact the way researchers explore and interpret a phenomenon (Guba and Lincoln, 1994; Creswell, 2007; Kivunja and Kuyini, 2017). The most common paradigms in research are positivism, interpretivism (constructivism), transformative (critical) paradigm, and pragmatism (Creswell, 2014). Each paradigm tries to discover a different form of reality related to the problem under the scope. They determine the stance of researchers and impact the decisions ranging from how the reality is embraced to what tools and methods are employed.

The paradigms represent different world views in terms of ontology (nature of reality), epistemology (nature of knowledge), axiology (ethics and value systems), rhetoric (the language of the research) and methodology (the methods to collect and analyze data) (Creswell, 2007, p. 17). In Table 9, three of the research

paradigms, positivism, interpretivism (constructivism), and transformative (critical) paradigm, are examined with respect to their peculiarities.

Table 9. Common paradigms in design research.

Principles **(Creswell, 2014)**	**Positivism/ Postpositivism**	**Transformative/ Critical**	**Interpretivism/ Constructivism**
Aim **(Guba and Lincoln, 1994, p. 112)**	Explain	Critique and emancipate	Explore
Ontology **(nature of reality)** **(Guba and Lincoln, 1994, p. 112; Creswell, 2007, p. 17; Scotland, 2012)**	Naive relativism	Historical realism	Multiple and subjective realism
Epistemology **(nature of knowledge, the relationship of the researcher and the researched phenomenon)** **(Creswell, 2007, p. 17; Freire, 1970, p. 51; Scotland, 2012)**	Researcher, and the researched phenomenon are separate entities	Researcher, and participants are equal subjects in the dialectical task	Researcher and the researched interacts with each other in the real context
Axiology **(Ethics and Values)** **(Guba and Lincoln, 1994, p. 112; Creswell, 2007, p.17)**	Researcher is objective, and values are excluded	Researcher is value-laden, acknowledges subjectivity and discusses values transparently	Researcher acknowledges subjectivity and discusses values transparently
Rhetoric **(Language)** **(Guba and Lincoln, 1994, p. 112; Creswell, 2007, p. 17)**	"Disinterested scientist as informer of decision makers, policy makers, and change agents"	"Transformative intellectual", advocate and activist	"Passionate participant", *An engaging qualitative research language with the first-person narrative
Data Collection Methods **(Research process)** **(Creswell, 2007, p. 17; Scotland, 2012)**	Experimental	Dialogic/Dialectical	Inductive
Quality Criteria **(Guba and Lincoln, 1994, p. 112)**	Internal and external validity, reliability, objectivity	"Historical situatedness, erosion of ignorance, action stimulus"	"Trustworthiness, authenticity, and misapprehensions"

The most common research paradigm is the positivist paradigm, which takes roots from the experimentation of hypotheses, followed by the definition of theories and laws, aiming to explain a measurable phenomenon. This paradigm regards that reality can only be revealed through experiments and in a deductive way, and the researcher needs to elude from all bias and subjectivity in reaching conclusions. Burns (2000) explains that the quality of positivist research has to be assessed based on the following four dimensions:

- **Internal validity:** Cause and effect relationship is built correctly.
- **External validity:** The results can be applied to other settings.
- **Reliability:** The results are consistent in time.
- **Objectivity:** All sorts of bias are reduced, and subjectivity is prevented.

Interpretivism, as a paradigm which stands against the positivist paradigm based on ontological and epistemological stance, suggests that realities are multiple and socially constructed. The central aim of interpretivism is to understand the subjective world surrounding human experience (Guba and Lincoln, 1989). Therefore, unlike positivism, interpretivism benefits from an inductive approach, which means the reality is built on the data. Besides, the paradigm accepts an inevitable interaction between the researcher and the researched phenomenon. Interpretivism highlights the significance of the researchers' own cognitive models and experiences to give meaning to multiple realities, which can only be explored through social interactions and by using naturalistic research methods (Kivunja and Kuyini, 2017). Thus, the outcomes comprise the values of the researcher. Nevertheless, *transparency* and *reflexivity* of explaining these interactions and the *context* of research have to be given emphasis in order to keep objectivity (Lincoln and Guba, 1985; Kivunja and Kuyini, 2017).

Critical paradigm is grounded in similar principles with the interpretivist paradigm, such as counting on the socially constructed realities. However, the researched phenomenon and research process distinguish the critical paradigm from others. The paradigm aims to create a transformation by giving voice to topics that challenge the status quo (e.g., power relations, gender inequality) and attempts for an equal and democratic society. It aims to reveal societal ideologies

influenced by power relations, by benefiting from historical realism and dialectical methodologies. Additionally, this paradigm recognizes language to be an essential tool as it reproduces power relations. Therefore, the language needs to be empowered or weakened (Scotland, 2012, p.13).

These paradigms offer diverse ways of looking into a phenomenon and the research practice itself. They differentiate the way a researcher embraces reality, makes meaning of reality, and conveys this meaning to create shared knowledge. Hence, the outcome of this procedure needs to be treated differently. There are several approaches proposing why and how research should be formulated, conducted and assessed, with explanations mostly rooted in the positivist tradition of research. Among them, the explanation of the characteristics of scientific research forms an important basis to assess research quality. According to Guba (1981), four aspects of positivism relate to interpretivism as:

- **Credibility:** The data is trustworthy, authentic, and in line with reality.
- **Transferability:** The outcomes can be transferred and applied in other fields.
- **Dependability:** Same outcomes can be observed in similar circumstances.
- **Confirmability:** The bias is minimized or eliminated, and the outcomes can be validated by other people.

Recognizing the research paradigm is a necessary step in designing a well-grounded research methodology. Utilization of the relevant research strategy follows acknowledgement of the paradigm. The following section presents the strategies of this research.

5.2. Research Strategy

Formulating a research strategy in line with the research paradigm is an essential feature of research quality. This research lies at the intersection of various qualitative research strategies. In the following sections, the peculiarities of the research strategies are given with respect to their relevance to the research objectives.

5.2.1. Practice-Led Research

This research shows the characteristics of practice-led research on the grounds of two aspects: exploring the researcher's own human-centered design practice and connecting the gap between academic and industrial knowledge.

To begin with, understanding designers' work practices are gaining significance regarding the transition in the roles of designers in a complex world (Swann, 2002; Muratovski, 2016). Muratovski (2016, pp. 190-191) describes applied research as "a type of research that enables practitioners to reflect on and evaluate their own work". In this context, practice-led research helps to reveal the creative process transparently to frame opportunities and challenges (Crouch and Pearce, 2012; Muratovski, 2016). Therefore, it forms a useful strategy to focus on designerly practices.

Secondly, pursuing a practice-led Ph.D. research has been gaining significance due to its potential to link industrial and academic knowledge (Durling, 2002; Allpress et al., 2012). The aim of practice-led research is the creation of knowledge regarding design practice. Moreover, it differentiates from practice-based research with its emphasis on the knowledge rather than authentic artifact (Candy, 2006a; Muratovski, 2016, p. 192). Therefore, practice-led research strategy helps to fill the knowledge gap about the industrial practice.

The quality of the applied research is measured by the clarity of the purpose, context, rationale, and outcome. Firstly, the research questions need to develop knowledge in the research field. Secondly, the researcher should address the significance of the research topic, provide other approaches in the research area, and convey the contributions of the research to the field. Thirdly, the researcher needs to specify the rationale behind choosing the specific methods. Finally, the researcher should provide the outcome that demonstrates critical reflection (Candy, 2006b; Muratovski, 2016, p. 199).

5.2.2. Case Study

Practice-led research shows characteristics of a case study (Muratovski, 2016, p. 197, p. 200), which requires us to examine what case study means. “A case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context” (Yin, 2009, p. 18). It facilitates the comprehension of a phenomenon, its substantive processes and the actors involved, in order to describe, explain, predict or control processes related to the phenomenon at the individual, group and organizational levels (Woodside and Wilson, 2003; Gagnon, 2010, p. 2; Farquhar, 2012, p. 6). The outcomes are rich due to the collection of data from multiple means, and the investigations are in-depth as they are from real context.

Scholars recognize the importance of setting research objectives in advance as case study research results in very broad data surrounding the phenomenon (Creswell, 2007; Farquhar, 2012, p. 7). Regarding this, Yin (2009, p. 18) suggests applying case study research to answer questions such as when, how and why, if the researcher has no or little control over events, and if a contemporary phenomenon is investigated. This way, evolving and changing patterns, contemporary issues, or interactions are captured. Through the literature review, I came across a number of studies that adopt a case study strategy to explore the BoP product development processes (See Sanchez et al., 2005; Pansera and Owen, 2015). In my own situation, I decided to apply case study research in order to learn about how the product development process for the BoP communities takes place in a corporate setting.

There are different types of case study research. Stake (1995) embraces them in three categories: intrinsic, instrumental, and collective case studies. He distinguishes them based on the examination taking place in order to learn about a phenomenon through a particular case, its relation to something else, and a particular phenomenon through different cases. Another scholar, Yin (2009), proposes four types of case study being holistic, embedded, single and multiple case studies. Farquhar (2012) adds that researching a phenomenon over the years is defined as longitudinal, and it has certain benefits in revealing the process and

its dynamic patterns. In my research, although it started with the longitudinal research of one intrinsic case, as I was immersed in the research topic, I realized there were instrumental cases (sub-cases) which could answer my first research question, i.e., revealing the skill set of the human-centered researcher in the BoP product development process. Regarding this, I have adopted Yin's (2009) embedded case study strategy (one major case study with sub-cases), and I examined two product development cases and six internal and external collaboration cases to find out about the methods and their function in the overall BoP product development process (See Section 5.2.2.1. Sampling of the Cases for a list of cases).

Yin (2009, p. 173) lists the elements of a valid and reliable case study under four categories, which are construct validity, internal validity, external validity, and reliability. To achieve construct validity, the researcher should check the operational relationship of subjective judgments by examining multiple sources. Hence, the knowledge is created through primary and secondary sources, and across the cases, which ensures data triangulation of the evidence (Yin, 2009; Farquhar, 2012, p. 7; Muratovski, 2016, p. 39). For the second element, internal validity, the researcher should try to explain all the factors in the observed case. The author explains the ways to increase internal validity as "pattern matching, explanation building, addressing rival explanations, and using logic models" (p. 179). For the third element of research, the author suggests embracing research questions and finding illustrative cases where the findings can extend beyond the study itself. Finally, for reliability, he suggests making the steps taken in the research clear so that it can be repeatable. Besides, the existence of another researcher checking the outcomes is recommended. In my research, the fourth element is satisfied by asking the product leader and the department manager their ideas on the research progress.

In my research, the case study strategy allowed me to formulate those that happen to be independent of the researcher's availability. These are, for instance, how and why designing for the BoP takes place in a corporate company, what the product development process phases are, who the stakeholders are, and which contemporary methods and approaches are available to inform the practices of the

product development teams. Nevertheless, drawing knowledge on these aspects requires compilation of accurate cases. In the following section, the sampling and context of the cases are elaborated.

5.2.2.1. Sampling of the Cases

I worked in the long-term BoP product development project of BSH Home Appliances Company in Turkey between February 2016 and August 2018. Within this duration, I was involved in two new product development cases (Cases 1 and 2) and six internal and external collaboration cases (Cases 3-8), accompanying the product development projects on a range of BoP topics (Table 10).

Table 10. The cases and their description.

Case Number	Dates	Description	Stakeholders

Case 1	February 2016 - March 2018	Innovative, low-cost, and off-grid product development for keeping food fresh for a longer period	**Product Development:**
			• Product development team (between February 2016 – June 2017)
			  ○ Project leader
			  ○ UX Researcher (the author)
			  ○ Design engineer
			  ○ MSc students for mechanical design and material development
			• Academicians
			• Material R&D company
			• Agile product development team (between June 2017 – March 2018)
			  ○ Designer
			  ○ Design engineers
			  ○ Supply chain engineers
			  ○ Quality test engineers
			  ○ Business model engineers
			  ○ Material engineers
			User Research:
			• Project leader
			• UX researcher (author)
			• Marketing department
			• UX department in Germany
			• African experts
			Business:
			• Project leader
			• Management
			• Management trainees

Table 10 (cont'd)			
Case 2	June 2017 - August 2018	Low-cost, and off-grid product development for efficient cooking (only ideation phase)	**Agile product development team:** • Industrial designer • Design engineers • Supply chain engineers • Quality test engineers • Business model engineers • Material engineers • Student designer (Creative facilitator)
Case 3	June - September 2016	Business-model ideation with marketing management trainees in Germany	• Project team in Germany • UX researcher (the author) • Management trainees
Case 4	May 2016 - January 2017	Collaboration with the Department of Industrial Design at Istanbul Technical University in Istanbul, Turkey. Conceptual product ideation for increasing quality of life.	• Project leader • UX researcher (the author) • Academicians • 48 3rd year studio students • Food engineer • Mechanical engineer
Case 5	August 2016 - November 2017	Collaboration with the Department of Industrial Design at Middle East Technical University in Ankara, Turkey. Conceptual product ideation for washing laundry.	• Project leader • UX researcher (the author) • Academicians • 49 4th year studio students • African experts • Mechanical engineer
Case 6	October 2017 - May 2018	Collaboration with the Department of Industrial Design at Middle East Technical University in Ankara, Turkey for the graduation project. Conceptual product ideation for alternative cooking.	• Department manager • UX researcher (the author) • Academicians • 4th year student • Engineers • University official body (TTO)
Case 7	October 2017 - May 2018	Collaboration with a student from the Department of Industrial Design at Middle East Technical University in Ankara, Turkey for the graduation project. Conceptual product ideation for food drying.	• Department manager • UX researcher (the author) • 4th year student • Engineers • University official body (TTO)
Case 8	July - October 2016	Start-up idea acquisition	• Project team in Germany • UX researcher (the author)

The cases are given numbers based on the institutional distance. Cases 1, 2, and 3 were carried out within the company, by the product development team in Turkey (Cases 1 and 2), and with management trainees in Germany (Case 3).

Other cases were carried out externally with two universities in Turkey (Cases 4-7), and a start-up (Case 8) from a developing country[2]. University project partners were industrial design departments from Istanbul Technical University (İTÜ

[2] The name of the start-up is not mentioned due to confidentiality.

Kurumsal İletişim Ofisi, 2017), and Middle East Technical University (METU Department of Industrial Design, 2017; METU Department of Industrial Design, 2018, Airy and Horus). The university project cases involved studio (Cases 4 and 5) and graduation projects (Cases 6 and 7). The university projects were realized with the purpose of acquiring student ideas which could pass the strategic assessment of the company. Similarly, startup collaboration was carried out to acquire an efficient product concept designed by the startup.

The level of participation in these cases is explained in the following section.

5.2.2.2. Level of Participation

The degree of the researcher's involvement in the observed culture determines the stance of the researcher. Observation types are based on the membership within a culture and involve (Siegel, 2018):

- Non-participation: Observe from outside (No membership role).
- Passive participation: Observe from inside without participating (No membership role).
- Moderate participation: Observe from inside with partial participation (Peripheral membership).
- Active participation: Observe from inside with active participation (Active membership).
- Complete participation: Observe from inside with complete participation (Full membership).

My level of participation in eight cases ranged from complete, and moderate to no participation (Table 11).

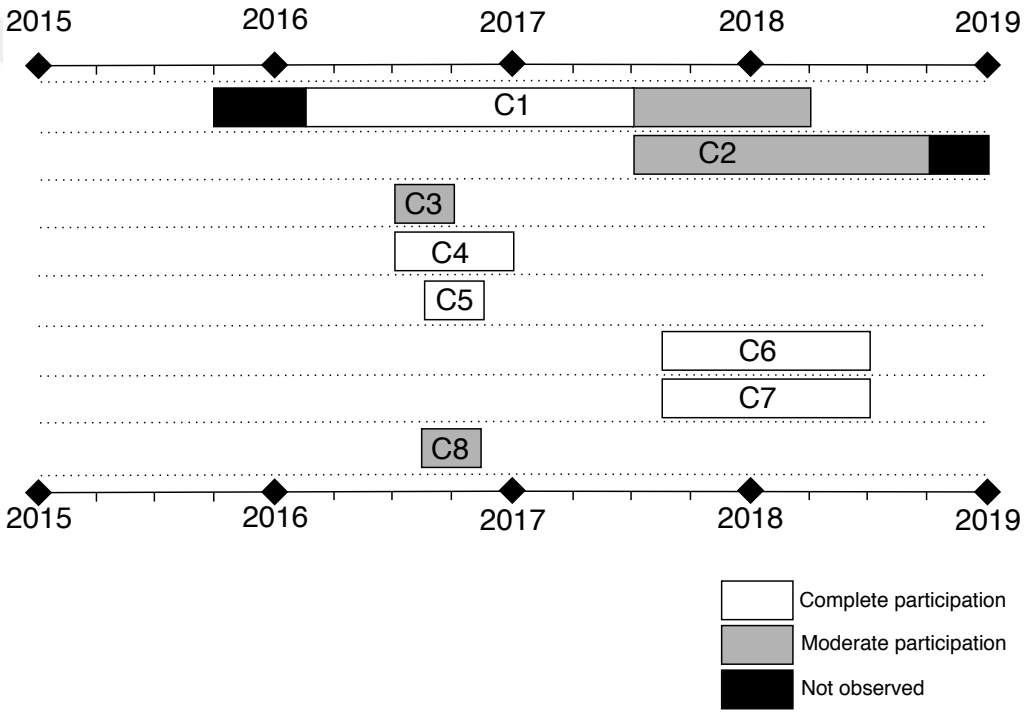
The food preservation case (Case 1) had started with strategy development before I joined the product development team. By February 2016, my longest complete observation and participation started, and it continued until August 2017.

Upon the transfer of the project to another team for mass manufacturing, I began to observe the manufacturing process of another team (i.e., agile development

team). Similarly, I observed the product development process for efficient cooking (Case 2), business ideation with management trainees (Case 3), and the startup acquisition (Case 8) by moderately participating. There, I supported the teams with research and human-centered assessments.

In the remaining cases (Case 4-7), I participated completely in collaboration activities. I mediated the communication between stakeholders, observed the research and ideation phases of student designers, and suggested evaluation methods for the BoP context feasibility considering human-centered aspects.

Table 11. Timetable of the cases involved and observed.



Case 1: February 2016 – June 2017 (Complete participation), June 2017 - March 2018 (Moderate participation)
Case 2: June 2017 - August 2018 (Moderate participation)
Case 3: June - September 2016 (Moderate participation)
Case 4: May 2016 - January 2017 (Complete participation)
Case 5: August - November 2016 (Complete participation)
Case 6-7: October 2017 - May 2018 (Complete participation)
Case 8: July - October 2016 (Moderate participation)

A holistic experience of the product development process was made possible by being involved in eight cases with the characteristics described in the previous

two sections. In the following section, the research strategy utilized to capture the professional experience in these cases is elaborated.

5.2.3. Autoethnography

In order to describe the role of the human-centered designer in the product development process, a strategy that is rooted in the analysis of personal and professional experience has to be adopted. On this ground, I have chosen a strategy in which I do not need to separate myself from what I know and what I research, and my values and perspectives that influence my interactions with the stakeholders are transparently available (Pitard, 2017).

Autoethnography is a qualitative research method that prioritizes the experience of an individual to understand experiences (Ellis, Adams and Bochner, 2011). The strategy emerged as a contrary movement to the traditional research approaches that do not seize the influence of the researcher's perspective onto the research process, outcomes and culture creation (Bochner, 2014; Adams, Ellis and Jones, 2017). It accepts the researcher's subjectivity and features authentic and reflexive data generation by capturing personal beliefs, perspectives, and observations (Goldschmidt, 1977; Adams, Ellis and Jones, 2017).

Pace (2012, p. 2) describes autoethnographers as people who "reflexively explore their personal experiences and their interactions with others as a way of achieving wider cultural, political or social understanding". Autoethnographers call on memories to write about themselves through a retrospective examination. Therefore, autoethnography can be written in the first person and a narrative style (Ellis, 2004; Bartlett, 2009, cited in Pace, 2012). Although the primary source of autoethnography is reported as participant-observation, the data collection process is guided by other methods such as keeping personal journals, work logs, memos, examining photos, and conducting interviews, which affirm data triangulation (Duncan, 2004; Ellis, 2004).

Autoethnography is adopted in creative research domains due to its advantages in the reflection of personal and professional experiences (Pedgley, 2007; Duncan,

2004; Erikkson, 2010; Pace, 2012). It allows researchers to deal with an ambiguous design process through systematic inquiry (Duncan, 2004; Munro, 2011). The examples of autoethnography in the design literature include designerly practices. For instance, Pedgley (2007) used autoethnography to record his creative process of guitar design. Duncan (2004) reflected on his experience of using autoethnography to explore his own hypermedia CD-ROM creation activities to improve his design practice. Another scholar, Erikkson (2010) used autoethnography to observe his own practice concerning the representation of virtuality in images.

Pace (2012) recognizes two types of autoethnography, being evocative and analytic. The author compares them regarding qualities such as narrative properties, the position of the researcher in the narration, and the theoretical commitment. Based on the study of Ellis (2004, p. 30), he recognizes the characteristics of evocative autoethnography as having a first-person writing style with novel/biography-like sequential narration that expresses emotional and private experiences in reflexive connection to other people. The outcome of an evocative autoethnography may end up with a narrative, a character, or a representation of experience (Ellis, 2004). Comparatively, by referring to Anderson (2006), he calls the cases analytic if the researcher is one of the members of the examined social world, follows analytic reflexivity to reveal reciprocal relation between the researcher and others, and the focus is not on describing individual experiences but theoretical analysis. Narratively, the researcher is identifiable in the text, and the dialogues are beyond the researcher's entity.

In my own case, I decided to apply autoethnography based on its several advantages. First of all, I was part of the researched phenomenon regarding my position and interactions. I participated in the product development process as an *insider* with my "user experience researcher" role, while researching about human-centered product development process to inform the *outsiders* (See Section 5.5.1. Insider Outsider Duality). We reciprocally produced the reality, the product development process, and the product itself, together with the product development team. The product development team and I interacted in this socially

constructed process and produced a solid outcome together, which was worth to examine in order to answer my research question. This would have only been embraced with an approach in which the researcher was part of the research process itself. Moreover, I needed a method to keep track of the relationships that influenced the way I was cognitively involved in the design process.

Secondly, I believed that the BoP research domain, which is described as a complex problem, would only be embraced by a researcher who is experienced and informed about the problem setting. Mentioned by Adams, Ellis and Jones (2017), one of the advantages of autoethnography is giving researchers their voice because their accounts are more valid than the ones who have limited or no experience about the problem domain. Therefore, autoethnography provided an opportunity to reveal grounded information about a complex problem domain.

Thirdly, although the research onto the products was common in the literature, research into the product development process itself was lacking. I assumed that a method that is effective in capturing what had not been captured before through a living process would facilitate the portrayal of the nuances that might be lost in traditional approaches due to the generalization factor (Adams, Ellis and Jones, 2017). Therefore, autoethnography gave me the opportunity to collect an intensive range of data.

Fourthly, the advantage of capturing moments of everyday experiences by becoming part of the real setting and writing about what we see, hear, think and feel in an unobtrusive way, empowered my choice of autoethnography (Adams, Ellis and Jones, 2017). This way, I had a chance to increase the knowledge in a ubiquitous way, regarding the elements of product development, the tasks, and the set of skills applied.

There are a number of studies reporting the benefits of employing analytic strategies in autoethnography (Anderson, 2006; Pace, 2012; Livesey and Runeson, 2018). One of these strategies is employing analytic auto-ethnography built on the grounded theory approach (Pace, 2012). In my study, I decided to adopt the analytic autoethnography approach as I wanted to systematically collect and analyze data, and develop a theory (model) from this data. This decision was

due to making the outcomes of this research more comprehensible and adoptable by the target audience. The following section covers the grounded theory approach and includes the grounded theory procedure proposed by Pace (2012).

5.2.4. Grounded Theory

Grounded theory (GT) is an interpretivist mode of inquiry that has its roots in the exploration of actions considered primary to the experience of a social phenomenon (Glaser and Strauss, 1967; Goulding, 2002, p.40). The perspective was introduced first by the scholars Glaser and Strauss (1967), holding the belief that one can understand reality only by being part of oneself. In addition, they embraced life as a complex, changing, and variable process, which impacts the nature of human experiences. As a result, they recognized the importance of a theory built on observed realities (Goulding, 2002, p. 40).

GT as a symbolic interactionist approach, regards that reality can only be embraced through a socialization process (Locke, 2001, p. 25; Goulding, 2002, p. 39). This means that the researcher has to enter the world of social interactions in order to make sense of people's behaviors, thoughts, and actions. The researcher has to keep track of interactions in their natural setting, then embrace them analytically to come up with a theory, which initiates a start for a topic with little knowledge. Hereby, what distinguishes a GT from other qualitative inquiries is that it comes with the goal of going beyond providing a thick description (Glaser and Strauss, 1968; Goulding, 2002, p. 42; Creswell, 2007).

GT has been in transition; different versions and traditions have appeared. According to Goulding (2002, p. 46), the differences in GT originated from the traditional GT approach in *Discovery of Grounded Theory* by Glaser and Strauss, where the emphasis is more on the inductive and emergent nature of theory development, and Strauss and Corbin's *Basics of Qualitative Research*, with a stronger emphasis on the coding procedure (Goulding, 2002, p.47).

The opposition between two versions influences the way GT approach is utilized; GT is used both as a methodology and a data analysis method by social scientists

(Halaweh et al., 2008; O'Connor, 2012). There are a number of studies reporting the advantages of using a case study as a strategy and GT as a data analysis method (Halaweh et al., 2008; O'Connor, 2012). In my research, I recognize GT both as methodology and data analysis method as I captured data constantly and coded it in a cyclical way.

At this point, the determinants of the quality of GT research should also be given. In the pioneering studies of grounded theory (Glaser and Strauss, 1967; Glaser, 1978; Glaser, 1998), those are described as:

- Fit: The research outcomes are in line with the data provided.
- Relevance: The research is not bound to academic concerns and it grabs the real concerns in the researched phenomenon.
- Workability: The research offers analytical explanations to the researched phenomenon.
- Modifiability: Theory is open to modification with the addition of new data.

Holton and Wash (2017) describe the pillars of GT as emergence (concepts and relationships are formed from data), constant comparative analysis (the analysis of similarities and differences takes place on a comparative basis), and theoretical sampling (the process of generating theory).

The advantage of the grounded theory approach is that the analysis is not limited to the constructs available in the literature. In grounded theory, coding, as a process of deconstructing, labeling, comparing, embodying, and classifying data, allows new themes to appear. The first cycle of coding starts with basic assumptions and a free mind. The coding procedure continues through the axial coding cycle; the codes are classified and linked, forming up the categories. The literature is visited, and existing categories from the literature are used as a foundation in analysis to increase theoretical sensitivity. Finally, during the selective coding stage, the relationships between categories, and core categories emerge, and theorization takes place. All these stages are realized in a cyclical way (Corbin and Strauss, 1990). GT operates based on the emergence of:

- Codes: Generation of descriptive labels for significant occurrences.
- Concepts: Gathering codes with similar content.
- Categories: Gathering concepts with similar concepts to develop the theory.
- Theory: A group of categories which explain a phenomenon.

Pace (2012) proposes a practical method to employ grounded theory in autoethnography based on the approaches of Glaser, Strauss and Corbin, which follows the procedure given in Table 12.

Table 12. Applying grounded theory in autoethnography (Adopted from Pace, 2012).

Coding Flow	Procedure
Open coding	• Identification of significant concepts in the written stories of the researcher and breaking them into incidents. • Assigning codes to significant incidents. • Keeping theoretical memos about the perceived relationships to capture emerging theory. • Continuing until data is mature, then sorting memos into an outline.
Theoretical coding	• Comparing data constantly to reach relationships. • Detecting the relationships between the codes in parallel or after the initial coding to have a fully integrated theory.
Selective coding	• Continuing coding process until there is no more modification, and the core concept in data is identified.
Writing the theory	• Comparing the memos constantly for the similarities, connections, and conceptual orders. • Writing up the theory by sorting the memos into an outline.

It is often confusing to say that the purpose of research is to develop a *theory*, given that the number of cases is limited, or the researcher's account is subjective. To this end, one has to examine what theory means. Gregor (2006) explores the types of theories and categorizes their aims into four: description, explanation, prediction, and prescription. Respectively, GT explains a phenomenon by answering questions such as what, how, why, when, and where. Holton and Walsh (2017, pp. 16-17) argue that GT can be applied with any qualitative data collected through and analyzed with various methods. Besides, the resulting theory differs

depending on who is interpreting. Therefore, the philosophical assumptions of the researcher should be transparently provided (Holton and Walsh, 2017, pp. 16-17).

In GT, taking field notes stands as an important data collection method as they are quick reminders of momentary incidents. These notes help to capture sufficient details to develop elaborated memos and associated codes (Holton and Wash, 2017, pp. 70-71). The following section presents data collection methods utilized to apply GT analysis.

5.3. Research Methods

This research uses a number of data collection methods in order to maintain internal validity and data triangulation. The methods are elaborated in the following sections.

5.3.1. Participant Observation

Observation is defined as a systematic representation of human actions, behaviors, and artifacts through the real context (Marshall and Rossman, 1989, p. 79). The method allows embracing a social phenomenon using five senses (Erlandson, Harris, Skipper and Allen, 1993). It is used to sense, for instance, interrelations, cultural patterns, prioritizations, and social interactions (Kawulich, 2005). Some advantages of participant observation are an increased familiarization with the social organization, and better explanation of the dynamic context (Marshall and Rossman, 1989, p. 79; Bernard, 1994; Kawulich, 2005). Glesne (2011) categorize observation roles as *observer, observer as participant, participant as observer,* and *full participant*, based on the researcher's position in the observed community. Respectively, they mean that the researcher observes without revealing identity, the researcher's primary role is observing and has little interaction with the members of the group, the researcher is more of a participant than being an observer, and the researcher fully participates in the group, even may be employed by the institution s/he is observing.

I was a *full participant* in the product development team functioning in Turkey and Nigeria[3] (also see Section 5.2.2.2. Level of Participation for involvement in the cases; Figure 19). The team was fully informed about my identity as a Ph.D. researcher. Though it posed a challenge regarding project confidentiality the project leader and later on department manager were frequently updated about the research progress (See 5.5.2. Ethical Considerations). Through the participant observation, I revealed the product development process phases, stakeholders of product development and collaborations, methods and tools, challenges and opportunities, and implications for product development for low-income communities.

Figure 19. Product development team during the field visit.

5.3.2. Expert Opinions

Taking expert opinions is a common method in the BoP domain, especially on demand for data validation (Lappeman, Ransome and Louw, 2019).

The experts were consulted by the product development team on several occasions. The team took the opinion of experts in order to guide human-centered knowledge creation, and triangulate the insights obtained from user research

[3] Between May 22-30, 2016.

(secondary research, distant visual ethnography, photo survey, field observation, and FGDs in Nigeria). The internally consulted experts involved corporate business decision-makers distributed globally, and five African employees working in Turkey. Whereas, the external experts included NGO representatives and strategic consultants across Europe and developing countries.

I was involved in the preparation of the list of topics or questions to be discussed with the experts. The project leader frequently took expert opinions and informed the rest of the team about the insights obtained. This process was carried out by using the conversational interviewing technique (Given, 2008), and the interviews were carried out face to face, on the phone, and by using a business video call software (Skype for Business). In addition to interviews, expert opinions were occasionally taken with e-mails (See Section 5.3.3.4. E-mails) and a smartphone messaging app (Whatsapp) (Figure 20). I noted the insights from experts in the journals (See Section 5.3.3.1. Journals).

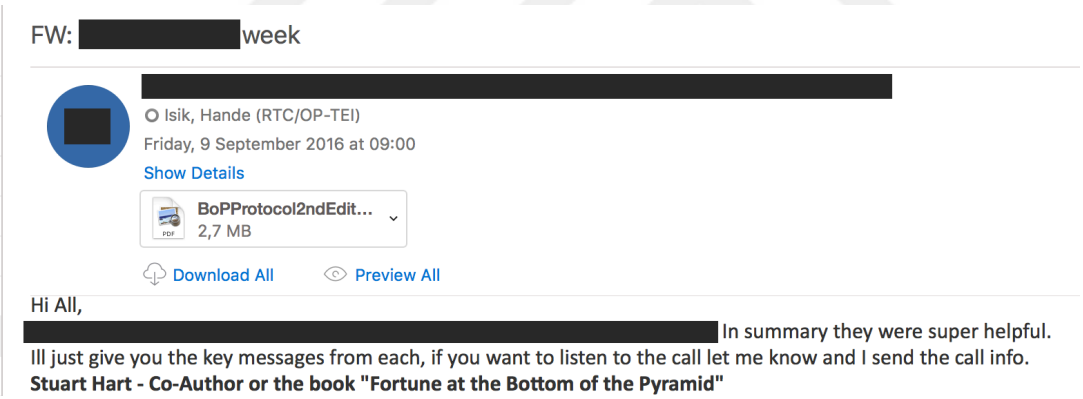


Figure 20. The example of an incoming e-mail.

5.3.3. Document Analysis

Taking field notes is a commonly utilized method in ethnographic research. The field notes are a collection of records associated with the experience of the researcher in the real setting (Tenzek, 2018). They ease the researcher's immersion in a new context, which, over a period, results in learning about the context. The types of field notes are but not limited to journals, logs, scratch notes, and interview notes. With the notes, the researcher is able to accumulate

information and reveal patterns. The following two sections present the field notes comprising the journals and a work log. The subsequent two sections describe the document categories analyzed in parallel to the field notes.

5.3.3.1. Journals

Tenzek (2018) suggests two types of field notes: *descriptive* and *reflective*. According to the author, descriptive field notes provide a thick description of the context. They portray the way the context is experienced in a detailed way. Whereas, reflective field notes are built on the subjective accounts of the researcher; they may contain the interpretations, critical inferences, and even speculations. They allow the researcher to reflect on the observation.

In this research, I utilized a descriptive, reflective, and theoretical (for GT analysis) note-taking approach as part of an autoethnographic research strategy. I kept 15 journals (Figure 21), where I primarily (i) recorded my experience as a human-centered designer for the BoP context, along with tasks and sub-tasks, (ii) reflected on these tasks, challenges and opportunities, and (iii) coded the outcomes and associated them with the literature. The theoretical notes were the evolving pieces associated with the literature, coded on a cyclical basis from the very first day on the field to the last, forming the model presented in Chapter 9. The samples of the notes are provided in Table 13.

Descriptive notes in the journals provided information about the date, project time-scale, my tasks, subtasks, meetings and stakeholders, the product development team's stakeholders' expectations and needs, and questions. Reflective notes were on the problem domain and involved my sketches, impressions, interpretations, and reflections on the challenges and opportunities. Finally, theoretical notes were the pieces related to the literature, included the frameworks and model in progress.

Figure 21. The journals (Numbered from 1 to 15 from left to right, top to bottom).

I took notes of the tasks and impressions extensively in Case 1, which comprises the notes taken in Journals 1, 2, and 3. One journal is for recording field research/observation impressions for Case 1 (Journal 2), while the other four journals are for understanding problem context through the addition of other cases (Journal 3, 5, 6, 7). Another journal describes my position in the organization (Journal 8). Besides, there are three notebooks about the collaboration for academic research and student projects (Journal 9, 10, 11). Finally, there are four journals with limited information about the collaborations. The detailed information about the notebooks is provided in Table 14.

Table 13. Sample pages from the journals for descriptive, reflective, and theoretical notes.

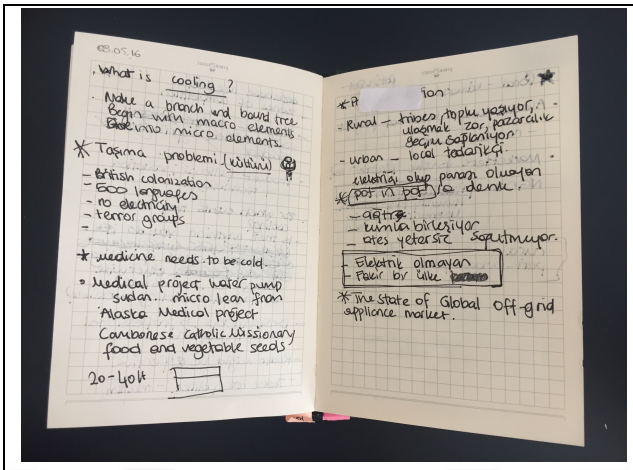
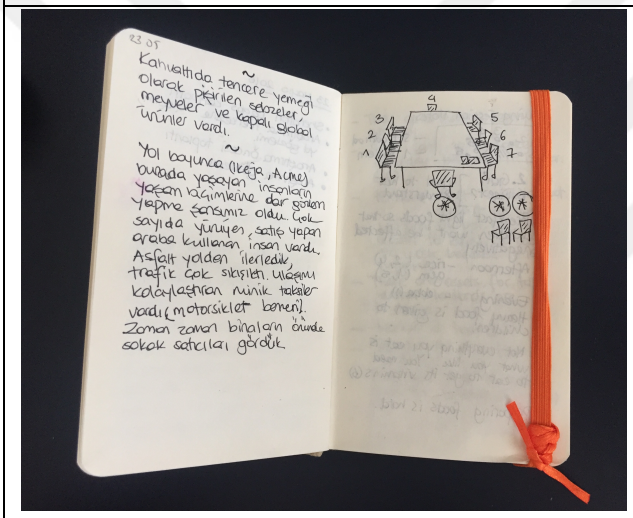
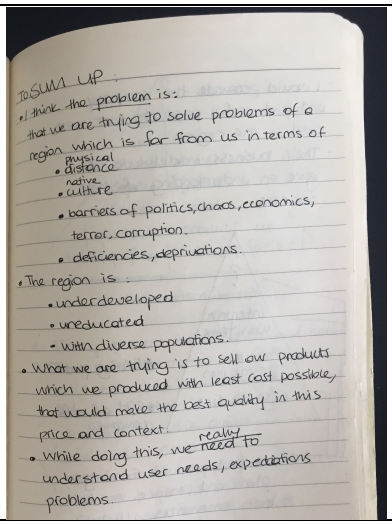
	Example of **descriptive notes** in Journal 1: The notes taken after a meeting with the product development team describe the problem context. Content includes notes on a local solution for food preservation, market characteristics, and possible stakeholders to contact.
	Example of **descriptive notes** in Journal 2: The notes taken during the field trip to Nigeria. Content includes a thick description of the field trip and the notes on FGDs.
	Example of **reflective notes** in Journal 3: My interpretations regarding the problem domain.

Table 13 (cont'd)

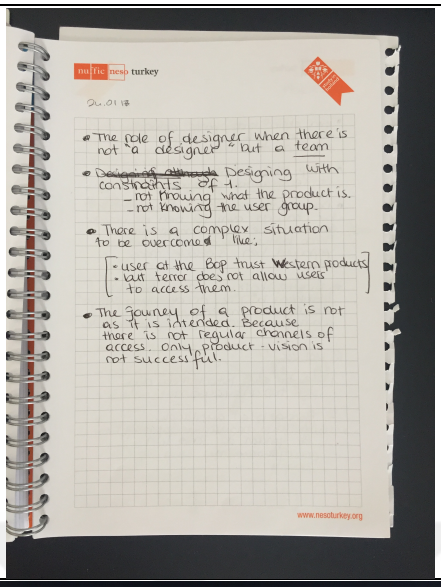
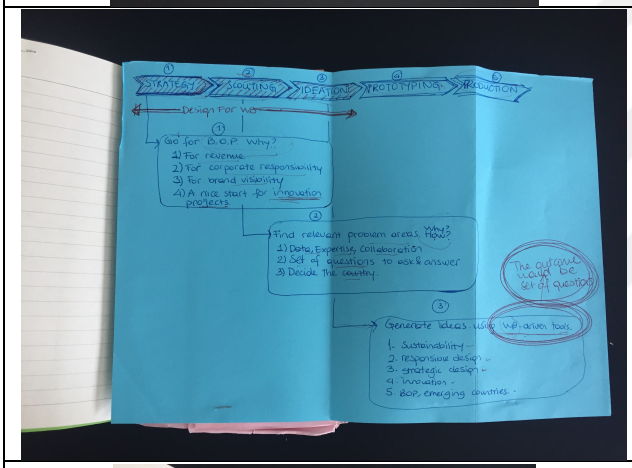
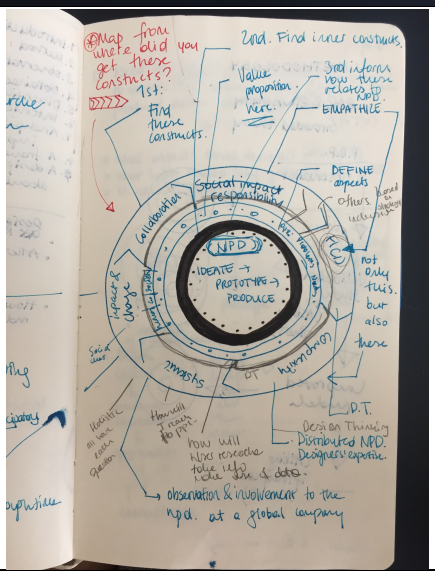
	Example of **reflective notes** in Journal 4: My interpretations regarding the role of the designer, design strategy, and challenges.
	Example of **theoretical notes** in Journal 3: The themes of the product development process phases and the diagram developed within the first year of observation.
	Example of **theoretical notes** in Journal 7: Obtaining categories through axial coding. Schematic representation.

Table 14. The journals and their peculiarities.

Journal	Pages	Used Between	Notes About	For Case(s)
1	27 pages	February-May 2016	Project briefing and exploration of the problem area (descriptive notes).	C1
2	99 pages	May 2016	Africa field visit and 16 focus group sessions. It also contains primary themes and keywords of the problem area for Case 1 (descriptive and reflective notes).	C1
3	39 pages	May 2016-December 2016	The initial impressions of the problem area and open coding (reflective and theoretical notes).	C1
4	54 pages	June 2016-June 2017	The tasks and impressions (descriptive and reflective notes).	C1, C3, C4, C5, C8
5	192 pages	December 2016-September 2017	The impressions of the problem area and the axial coding based on the observation (theoretical notes).	C1, C3, C4, C5, C8
6	192 pages	September 2017-February 2018	The impressions of the problem area and the axial coding based on the observation (theoretical notes).	C1, C3, C4, C5, C6, C7, C8
7	192 pages	February 2018-December 2018	The impressions of the problem area and the axial coding based on the observation (theoretical notes).	C1, C2, C3, C4, C5, C6, C7, C8
8	22 pages	June-August 2017	The researcher's role in the organization (reflective notes).	None
10-11-13	47; 47; 42 pages	November 2017; November 2017-January 2018; April-July 2018	The tasks for university collaboration in Cases 6-7 along with other project topics (descriptive and reflective notes).	C6, C7
9-12-14-15	40; 44; 23; 4 pages	9August-September 2017; January-February 2018; July 2018; August 2018	Facilitating creative workshops in different problem areas and projects (reflective notes).	C6, C7 (limited information).

5.3.3.2. Work Log

Second data collection method was a work log, the entries of daily work tasks. They were kept from the first day (February 8, 2016) to the last day at work (August 9, 2018). The work logs contained information about daily/weekly meetings, tasks, and documents worked on, corresponding team members, and ideas or challenges needed. The document was kept by using Microsoft Word, and it is a 28 KB Word Document with six pages and 2263 words. It contains entries for the eight BoP cases and some of the projects that are not included in this research. The example of an entry is provided in Figure 22.

Figure 22. Diary entry example.

I revised the work log for the confidentiality concerns of the organization and applied content analysis to the revised document, to describe each task based on month and case number. The revised document is a 22 KB Microsoft Word Document with three pages. It contains entries only for the eight BoP cases concerning relevant month information and task number. The coded work log is provided in Appendix E.

5.3.3.3. Digital Documents and Materials Developed by the Researcher

The third data collection method was documentation. I kept folders of the digital documents we worked on as a team, and that I worked on individually. The folders included:

- Photos from the field research
- Project progress reports developed by the product development team

- Consultancy reports about Africa and target countries
- Qualitative and quantitative evaluations of the problem context (target markets, market analysis, market segmentation, customer segments, user research).
- The materials I owned and developed (The list is given in Appendix F). These materials also include the artifacts of the human-centered designer (such as index 5, 20, 21, and 22 in Appendix F), and they were the key in the analysis of the designer's role.

5.3.3.4. E-mails

I examined 3714 e-mails on Microsoft Outlook, sent and received between February 8, 2016 and August 9, 2018. I prepared a visual map (Figure 23) of the daily/weekly tasks of the cases involved for the periods of February-July 2016, July 2016-March 2017, and March-December 2017 through the analysis of e-mails. The maps included dates, meetings, stakeholders, documents shared, and challenges and opportunities. They informed about the skills needed throughout the process.

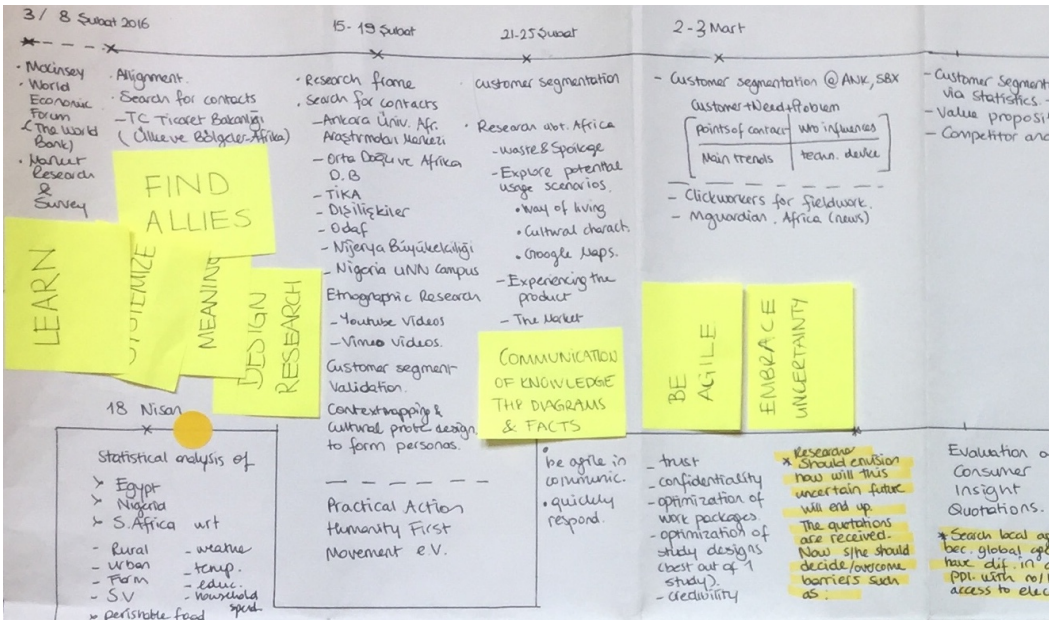


Figure 23. Visual map obtained through examination of e-mails.

5.3.4. Analysis

The data collection and analysis started on the first day of work when the observation began with notetaking. Throughout six months of observation, open coding continued in order to describe the landscape of the product development process. A comprehensive literature review on the BoP domain began after six months of observation when the field trip, FGDs, and analysis of the field trip were over, and university collaborations were beginning. I revisited the codes based on their theoretical relevance and continued axial coding. Meanwhile, the goals of observation were frequently updated (Table 15).

After this step, only the relevant codes from the journals were transferred to write autoethnographic inquiry pieces (memos) digitally as a Word document, based on the research aim and questions. These memos were enriched with entries from digital documents, materials, work logs, and e-mails to describe the experience throughout the product development process. The autoethnographic inquiry was coded axially to form the categories; the emergence of the categories and their relationships shaped the first version of the *model of roles* (Chapter 9). The model was iteratively revisited for theoretical relevance. The model was finalized when there was no more iteration. Figure 24 summarizes the steps of the analysis procedure.

The final version of the *model of roles*, provided in Chapter 9, was shared with the organization for credibility and confirmability of the analysis. After receiving comments and the approval of the organization, and on the comment of transferability to other cases than the BoP product development, the model reached its final form.

The following section examines the characteristics of the rhetoric, i.e., the style of language, utilized in this research.

Table 15. The research questions revisited regarding the progress of observation and the coding procedure.

Initial observation (2016): *Observation A: Designing for the BoP requires a human-centered approach.* • How can we embrace designing for the BoP in a more holistic way? • What would the considerations be for designing products and services for the BoP?
After literature review and observation of the research context for familiarization and formulation of the research (2016): *Observation B: For designing human-centered products, the constraints in the development process need to be overcome.* *Observation C: The constraints can be revealed by investigating the design process.* • How can we reveal the constraints and complexities in the product development process for the BoP?
After literature review and observation of the research context for exploring complexities (2017): Observation D: Design process needs to be embraced as a holistic process, including the human and non-human actors, methods and tools, and the complexities causing difficulty in applying the available knowledge. • How can we embrace designing for low-income communities in a holistic way? • How can an appropriate design approach to handle complexities of the designing for low-income communities be formulated? • How can we design for the low-income communities by embracing the challenges available? • How and to what extent can the outcomes of this research benefit designers?
Literature review and observation of the research context for holistic approaches (2017): *Observation E: Design process needs to be embraced as a holistic process including the design process and tools, data access channels and information quality, collaboration channels, and the complexities causing difficulty in applying the available knowledge.* • What is the role of user research and researcher in designing products/services/systems for low-income communities? • How should the approach for user research be, considering the challenges surrounding product/service/system development for low-income communities?
After literature review and observation of the research context for the role of designer (2018): *Observation F: The role of user researcher/human-centered designer in the design process of a corporate company adopting contemporary thinking methods is to facilitate the learning process to cope with the complexities of the BoP context.* • What is the role of user research/researcher/designer in designing products/services/systems for low-income communities? • How should the approach for user research be, considering the challenges surrounding product/service/system development for low-income communities?
After literature review and observation of the research context for the role of designer (2018): *Observation G: The role of human-centered designer in the design process of a corporate company adopting contemporary thinking methods is to facilitate the learning process to cope with the complexities of the BoP context.* • How does a human-centered designer take a role in the process of designing new products for the BoP? • What types of resources (skills, methods, tools, research and collaboration channels) are available for a human-centered designer? The sub-questions are: • How does a contemporary new product development process take place? • How does a contemporary new product development process adapt itself to address the needs of the unfamiliar BoP communities? • How is a human-centered designer positioned in a new product development process for the BoP communities? • What challenges are experienced in the course of product development for the BoP communities?
After literature review and observation of the research context for the role of designer (2018): *Observation G: The role of human-centered designer in the design process of a corporate company, adopting contemporary thinking methods, is to facilitate the learning process to cope with the complexities of not only BoP context but also ambiguous design problems of today and the future.* • How does the roles and responsibilities of the human-centered designer shape in the multinational company through the course of designing innovative products for the BoP communities? • How does the new product development process targeting BoP communities take place?

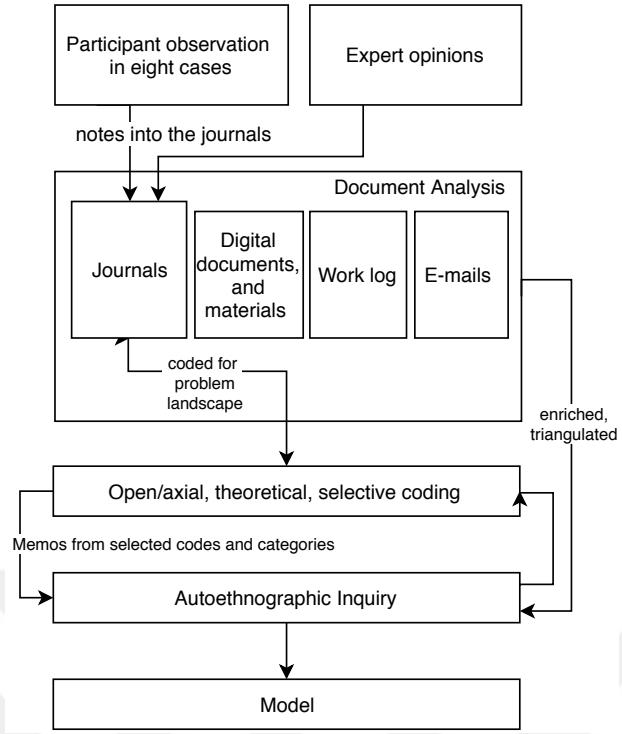


Figure 24. Analysis procedure.

5.4. Rhetoric

Rhetoric is a significant research principle as the research methods and strategies presented in the previous sections. It is what determines the voice of the researcher, and it has to be chosen depending on the research strategy and methods (Guba and Lincoln, 1994; Creswell, 2007). Creswell (2007) recognizes the language of the interpretivist paradigm as an engaging qualitative research language with the first-person narrative, in which the researcher plays the role of a passionate participant. Moreover, although some scholars argue that analytic autoethnography is beyond style (Anderson, 2006; Vryan, 2006), first-person accounts are recommended for autoethnographers (Hitchcock and Hughes, 1995). Based on the literature, and the advantages of improving understandability with respect to the multiplicity of the roles that I will be exploring in the next section, I decided to use the first-person style.

5.5. Researcher's Position, Ethics and Values

The researcher's position has to be revealed transparently and reflexively so that the readers can look through the lens of the researcher and interpret the outcomes similarly. This is also a necessity to ensure the *dependability* of research (Guba, 1981). This chapter discusses the researcher's position with respect to the researcher's relation to the observed organization, ethical considerations, values, and previous experiences.

5.5.1. Insider Outsider Duality

The insider outsider positionality is frequently mentioned by qualitative researchers (Maydell, 2010; Adams et al., 2017). In ethnography, the members of a culture are described as *insiders*. The ethnographer provides data to *outsiders* to make meaning of the insiders' cultural practices, experiences, thoughts, and feelings. Respectively, the role of the ethnographer is to provide a thick description of the internal processes to familiarize the readers with the culture.

Through the research process, I functioned both as an employee of the company and a Ph.D. researcher who was observing her influence on the product development team and the process (Figure 25). This observation was taking place to reveal my roles and skills contributing to the learning process of the company. The reality was being socially constructed based on the relationships of a social group.

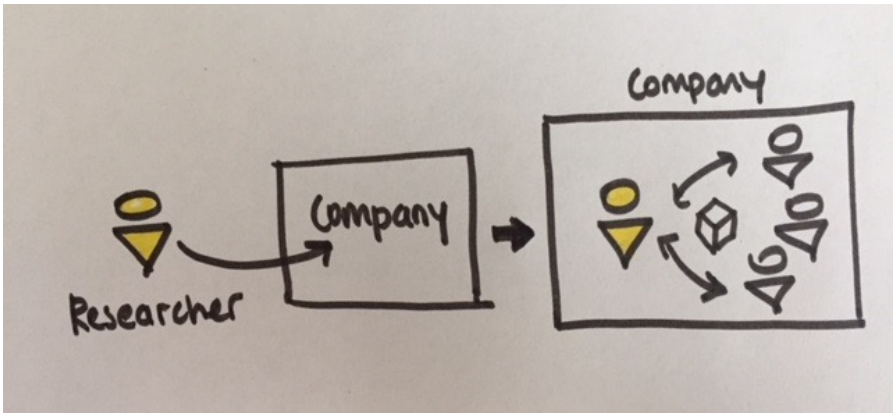


Figure 25. The position of the researcher.

My position throughout the research process contained the duality of being both an insider and an outsider. I worked home-office in Ankara, Turkey for Innovation and Technology Management department in Istanbul, Turkey, and met the project team personally and biweekly, 2 to 3 days on average. I was provided with a personal work computer to communicate through daily Skype meetings and e-mails with the project team and other stakeholders. I was an insider in the sense that I was fully involved in the product development process through e-mails and Skype meetings. However, I was an *outsider* to the *insiders* due to differences in work style (Figure 26).

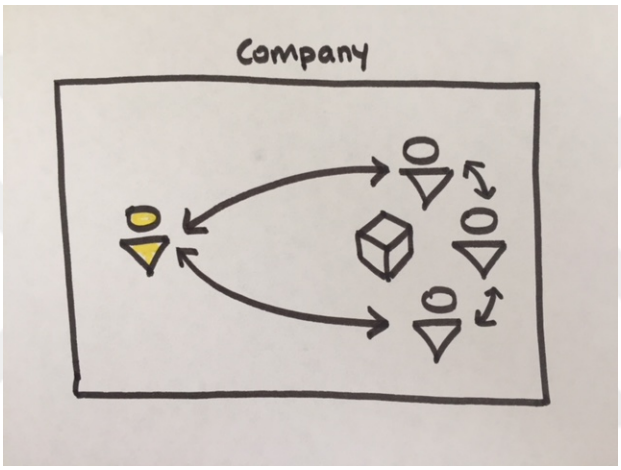


Figure 26. Insider and outsider positionality due to home-office work style.

This section presented the duality in the *employee-and-researcher* and *in-house-designer-and-home-office-designer* roles. This duality also has to be discussed within the ethical considerations. The next section presents the considerations prioritized through the research process.

5.5.2. Ethical Considerations

Although I worked as a Ph.D. student at BSH (BSH Türkiye, 2018a), I was not provided with specific research questions, and I was welcomed to choose my research questions as long as I was cultivating industrial design perspectives among the product development team through the course of product development for the BoP communities. However, the duality of the practice and the Ph.D. research was a challenge, given that it needed a massive effort to embrace an area

with complexity and pursue a Ph.D. research without specific research questions. Meanwhile, the project confidentiality was a barrier as it was restraining me from exposing the know-how about patent-pending product innovation.

As I was immersed in the field, I recognized the potentials of formulating a research built on my own practice. I observed that my skills were creating an impact on the practices of the team, the department I was affiliated to, and other departments. With this observation, I decided to describe the product development process phases objectively, and then interpret the way the human-centered designer's mind and skill set influences the product development process and related practices. The research scope also raised the interest of the industrial partner.

I frequently informed the product development team about my research procedure. Their verbal consent was taken before each thesis examination committee. The data collection and analysis were made under the permission of the former project leader (G. D. A.; between February 2016 and June 2017) and the manager of the department (H. E. T.; between June 2017 and August 2018).

I published two posters and one conference paper (See Appendix G and H and CV) with the permission and under the examination of the project leader and the department manager. The posters of this research have gone through the examination of the project leader (G. D. A.) on July 27, 2017. The conference paper was written with the consent of the department manager, and it was examined on January 31, 2019, and March 26, 2019. The chapters of this dissertation have gone through the examination of the department manager (H. E. T.) on February 6, 2018 (Chapter 7), May 28, 2018 (Chapter 8), January 1, 2019 (Chapters 5 and 8) and June 27, 2019 (Chapters 6 and 9).

The following section provides information about the values and previous experiences of the researcher.

5.5.3. Values and Previous Experience

The position of the researcher is of vital importance for gaining an understanding of what and how a researcher gets to know about a phenomenon (Pitard, 2017). According to Pitard (2017), the position needs to be described in a reflexive way because the previous experiences, beliefs, and assumptions determine the researcher's ontological and epistemological stance. Apart from race, gender, age, and education, the researcher should mention the philosophical beliefs and assumptions to guide the readers in connecting the researcher's past with the present. On the basis of these suggestions, I reveal my stance regarding the research topic as follows.

I am a 30 years old married woman, who has lived most of her life in Ankara except my childhood. Born to a family with a bureaucrat father, an academician/doctor mother, and a brother, I was raised with multiple perspectives and responsibilities from earlier ages. I have always heard the stories of self-dedication and doing good for the society. When I was 12, we moved to Adıyaman, one of the poorest cities in Turkey, due to my father's job in the government and I had my secondary education there for two years. The transition was quite puzzling for me and I gained an awareness about socio-economical discrepancies from earlier ages, which motivated me to do good for society.

I believed a strong educational record would help me to be an influential actor for contributing to the development of society. Throughout high school education, I was appraised for being an all-rounder regarding my skills in language, social sciences, and creativity-driven domains despite being trained in fundamental sciences.

I studied industrial engineering between 2007 and 2011 at Bilkent University in Ankara, Turkey. During my education, I realized that I had an interest in operational analysis methods and tools, which built the pathway for my specialization in the future. Nevertheless, as I was fully immersed in analytical problem solving, I felt the absence of applying my creativity-driven skills to express myself. Besides, through the course of my education, I had an ethical

conflict with purely profit-driven business strategies. This state raised my interest in social sciences, environmental science and ethics. Respectively, I took environmental science, and science, technology and society courses. Thereupon, I gained familiarity with the concepts of sustainability, holistic thinking and socio-technical approaches in social development. Moreover, I took courses on humanities, sociology, social psychology, social transformations in Turkey, and comparative politics courses in order to develop T-shaped thinking skills. These courses helped me to build empathy with the patterns of social relationships and interactions. By taking these courses, I had a motivation to apply to a sociology department in distant education and gained my second bachelor's degree from sociology from Anadolu University in 2014.

After obtaining my engineering degree, I applied to the Master of Science in industrial design program at Middle East Technical University. By taking the 2nd year studio, I felt confident in sketching, model making and user scenario development [4]. Besides, due to the relevance to my industrial engineering background, I took an ergonomics and usability course. In this course, I was guided to explore the current research trends within the field of ergonomics, and I met with the hedonic aspects of design through subjective wellbeing (happiness) research domain. I carried out research to support people in gaining healthy habits (i.e., physical activity) not in a forceful way as it was in persuasive technology, but in a way that addressed people's hedonic needs. This journey familiarized me with the usability, user experience, and positive design theories, and I carried out my master's research on the exploration of happiness evoking qualities of mobile apps.

After obtaining my master's degree and beginning my Ph.D. research, I received a job offer as a user experience researcher from a newly established start-up aiming to develop a social robot for improving the wellbeing of people with Alzheimer's

[4] While taking this course, people were surprised to learn that I was not trained in industrial design but industrial engineering. There were some instances that people encouraged me by expressing that 'I was way more "designer" than them' due to my skills in sketching and ideation. However, I felt the difference between me, and a person trained in industrial design was most apparent in the 3d visualization skills, i.e., computer aided product modelling and rendering.

disease. I thought the project, focusing on the social interactions with elderly people, was a perfect fit to apply the wellbeing theories. Besides, I wanted to take part in a project where theoretical knowledge could turn into a tangible outcome. With these motivations, I worked for the project team for five months. Meanwhile, the project team was preparing documents to apply to the TÜBİTAK and Horizon 2020 research supports. I documented the needs of people with Alzheimer's disease through literature review and suggested design recommendations for increasing not only the wellbeing of patients but also their families.

Along with my Ph.D. studies, I voluntarily worked for a non-governmental organization to build leadership skills in children living in the economically disadvantaged regions of Turkey. I carried out Skype sessions with children in Hakkari and facilitated discussions by following a moderator curriculum approved by the Ministry of Education of Turkey.

During my Ph.D., I took courses to improve further design research skills. I was surprised to see the methods (e.g., interaction matrix) applied in industrial engineering domain were adopted in other fields such as industrial design, which I realized while taking design methods course. This way, I had the feeling that I would form a bridge between my engineering and designerly skills. I also took a course on critical design and in this course, I gained acquaintance with actor-network theory and socio-technical approaches in design research. Again, I identified some similarities among the social sciences (based on social sciences, environmental science, and science, technology and society courses) and design approaches.

In the following period, I aimed to apply the wide range of skills into a real-life problem. With this intention, I worked for a research project, funded by BSH Home Appliances company, at UTEST usability labs of Middle East Technical University. In this 6-month project and as part of the project team, I examined the product qualities associated with wellbeing to inform innovative dishwasher rack design. My major contribution in this project was in the development of research

methodology, data analysis, and user-interface architecture. This project helped me to realize how significant role an everyday product could play in people's lives when wellbeing is the strategic objective.

With this project, I met the members of the Innovation and Technology Management department of BSH Home Appliances in Turkey. Being in search of a Ph.D. student to work in their BoP projects at that time, I was recommended to the project team to work as a user experience researcher based on my specialization in wellbeing and user research. I was offered a position in *Doctorate (Phd) Project Program*, to carry out a Ph.D. research about the BoP topic (BSH Türkiye, 2018a). I worked at the Innovation and Technology Management department and supported Corporate Innovation department in Munich - Germany between February 2016 and August 2018. It was very exciting to hear that they were going to work on a project aiming to target the needs of the people with low-income in Africa. The project was initiated as a corporate responsibility project, and the team was aiming to familiarize with African BoP communities in which I was going to play a role.

5.6. Conclusions to Chapter 5

This chapter presented the research design by referring to the principles of research and research quality. Based on the research aim and goals (See Chapter 1), it examined the interpretivist paradigm, demonstrated the convenience of the mixed method strategy and research design, and presented relevant data collection methods. Figure 27 summarizes the research methodology explained in this chapter.

The next three chapters will present the findings shaped by the research design, aim, and questions. Chapter 6 will focus on the autoethnographic inquiry; it will provide a transparent and reflective narration that expands on the personal and professional designer experience in a multinational company through the product development process for BoP communities. Chapter 7 will give the characteristics of the new product development process and their implications for the BoP

domain. Finally, Chapter 8 will present the roles the designer takes through the process of product development and collaborations.

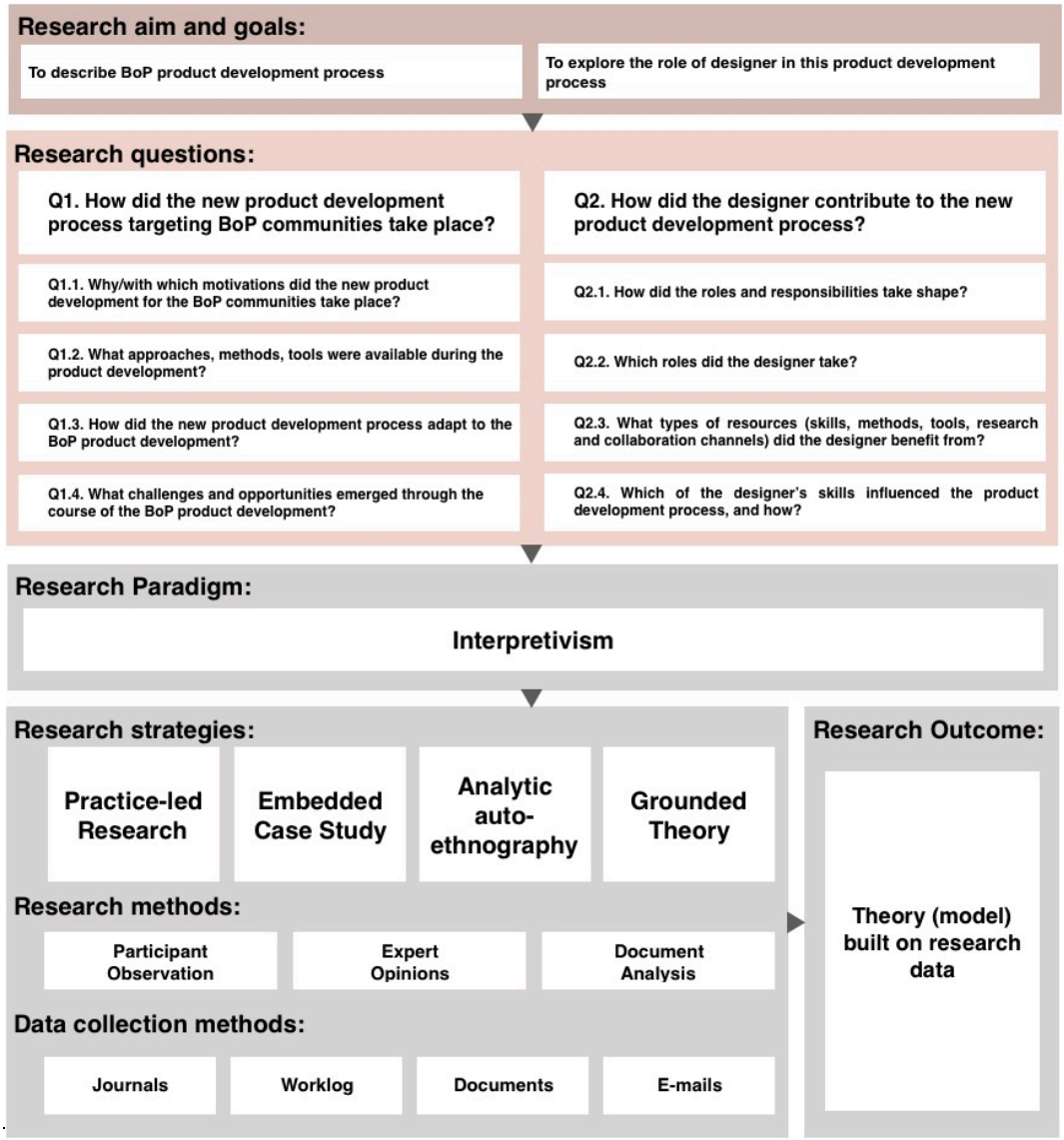


Figure 27. Research methodology.

CHAPTER 6

FINDINGS OF AUTOETHNOGRAPHY

In this chapter, I present my two-and-half-year experience as a human-centered design practitioner within the BoP product development team of a multinational company. I disclose how my immersion takes place in the BoP project, in which I initially started as a UX researcher and made a subtle change of direction into a human-centered design practitioner. I reveal my learning process and of the project team regarding decision making, objectives, approaches, tools, challenges, and opportunities that emerged during the product development phases. I discuss the opportunities in practice and interpret the influence of the human-centered approach on the product development team and our practices. And I explore the skills associated with the problem scope. The narrative text flow is based on the order of the observation; accompanied by the notes in journals, materials created throughout the process and tasks in the work log. The text adopts a transparent narration style emphasizing the authenticity of the involved cases (See Section 5.4. Rhetoric).

6.1. Immersion (November 2015-February 2016)

An essential concern in the new product development process is that it has to incorporate the relevant human resources in the product development team, and in the observed case, it was through the network between the company and the academic institution I was previously working for[5]. The institution, UTest Product Usability Lab at Middle East Technical University, was recognized for being an established research lab in Turkey. During November 2015, as a group of Ph.D. researchers affiliated to UTest, we received an e-mail indicating that the Innovation and Technology Management department of BSH were in search of

[5] This section is written by referring to the e-mails, memos in the Journal 1, Material 1, and Task T0.

MSc/Ph.D. students to work for their innovation project. On November 11, 2015, I was introduced to the manager and the project leader of that department in Middle East Technical University, Ankara, by the founder of the academic research lab. Following this meeting, I was asked to send an e-mail containing my Ph.D. research interests and long-term plans, and I wrote:

> I would like to carry out research about users' perceptions of healthiness/wellness by exploring the influence of an innovative product designed for a healthy and quality life. For this purpose, I aim to look at the multi-dimensional product development process holistically, reveal the determinants in decision-making, and embrace how users perceive these qualities. The outcomes of this research would inform the human-centered design strategies.
>
> My other research approach might be exploring how decision-making takes place in a foreign country and influences one's perception of an innovative product. I believe a Ph.D. research might benefit the stakeholders on the grounds of observing the impacts of cross-cultural decision-making on indigenous people.
>
> In the long-term, I would like to gain cross-cultural experience and carry out research that informs industrial practices. (H. Işık-Tosun, personal communication [E-mail], November 16, 2015)

As a response to this e-mail, I was asked to send a CV and meet the project leader on November 25, 2015, with a note saying that my research area was definitely relevant and the project leader wanted to talk about my previous research experience. During this meeting, I was told that they could not declare the project scope in detail; however, this was an innovative project that aimed to address the quality of life of people living in rural areas. Thereupon, I emphasized my interest in empowering people in disadvantaged conditions, considering it was completely in line with my personal values (See Section 5.5.3. Values and Previous Experience). On December 8, 2015, I sent a document with several questions regarding the organization's goals, their attitude towards my expectations, the product development process, the user research, and the working procedure.

On December 9, 2015, I had an international phone call from Germany; the project leader and I talked about my questions one by one. Right after, we agreed that my expertise could fit in the project, and I could pursue a Ph.D. research on this topic. Following this, I was interviewed by the human resources department responsible on December 25, 2015. Hereupon, I was invited to see the office in Istanbul on January 4, 2016, by the project leader where the project leader showed the initial prototype and shared the survey that they designed to learn about the

characteristics of people living in Africa without mentioning the confidential aspects. I received an acceptance e-mail on January 19, 2016 and had a meeting with the project leader on January 20, 2016, about what type of contribution I might make to the project in terms of market insight, customer analysis or market analysis.

The official project details were not fully declared until the day I was officially part of the organization. On February 3, 2016, I received an e-mail by the project leader with an attachment of four business consulting articles about the African market, asking me to familiarize myself with the problem context prior to the first day at work.

Having recently attended a social impact themed event[6] in Ankara, Turkey, I considered social design to be an important direction in the product design process for Africa and formulated my initial interest: How could determinants be formulated to envision the future impacts of a product? And, I noted my perceived associations in Journal 1 that might contribute to the problem context with:

- Branch and bound algorithm[7,]
- Social design, design for good and social change (social impact design)[8]

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[6] On January 23, 2016, I attended the social design event by Things Ankara society at TED University. During the event, a mind map exercise took place about social change, society, and social technology phenomena.

[7] Branch and Bound algorithm: B&B is a mathematical algorithm used to solve the complex optimization problems. The algorithm explores a set of feasible solutions through branching the solution space and by systematically coming closer to the optimal solution in each iteration. B&B algorithm served an analogy to approach the problem domain after the initial examination of the business reports, providing insights about the successful and failed examples of BoP product development. I considered revealing the characteristics of the product development process I was going to be involved in so that I could compare them with the characteristics of the previous efforts. I thought by trying to keep all variables of the product development process in parallel with the variables in existing cases in a controlled way, the product development process might succeed. However, later on, as I was immersed in the product development process, I observed that the variables were numerous and hard to define. Besides, the agility of the product development process made it harder to approach the problem context in a controlled way. Nevertheless, B&B analogy was an indicator that I perceived the benefit of utilizing systematic approaches rooted in iteration logic, which I associated with design thinking in the afterwards. While B&B algorithm was a mathematical approach aimed at getting closer to a feasible solution through iteration, design thinking was an approach built on human needs, aiming at optimizing the objectives about a product by ideating and prototyping iteratively until reaching a minimum viable product.

- Simple, easy to use, and socially connecting [product concept][9]

I also took notes of the questions to ask the project leader on the first day at work. These questions were:

- Who do we target? [in terms of] age, gender, [the] income distribution of the population.
- [What do we know about] daily routines, behaviors, ways of living of these people?
- Do we know about the barriers in daily life? Their potentials could be worked on. [Could we work any further on their potentials?]
    - grocery
    - infrastructure
    - environmental conditions
    - culture
    - user preferences
    - perceptions
- Changing life instead of selling things? [Which one do we prioritize?]
- Did you [the department in Germany] ask questions [to people in Africa]? With what type of research?
- [Whether the] Examination of successful business models [took place].

On the first day of the work, February 8, 2016, the project leader and I had a four-hour meeting concerning the project's primary targets and strategies for Case 1. Meanwhile, I noted the impressions to guide me further in the future[10].

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[8] With my previous perception of the project's connection to social design, I asked the project leader if this project fitted it. Seeing social design as an approach for a business model, she expressed that the business model was to be determined in parallel with the initial findings of the market research by our team. By this means, I observed that there was not a determined business approach for Case 1 at that time, and we attached different meanings to some terms, such as social design and social innovation.

[9] I noted [product] simplicity for Case 1 in Journal 1 after reading the documents and realizing the resource constraints in Africa.

[10] The project leader touched upon numerous aspects of the problem area. Hence, the notes of the first meeting were discursive and multi-dimensional. Nevertheless, note taking was a practical step

The project leader described Case 1 as a *disruptive innovation project*, aiming to create a pervasive change in African people's lives. She clarified that the product concept (first prototype) would have a high potential to address African people's needs if the idea could technically perform well and achieve the off-grid and low-cost criteria.

During this meeting, we talked about the problems and needs in Africa; the limited access to electricity and clean water were the primary concerns of populous community living across Africa. The project leader mentioned food preservation as a pain point caused by limited electricity. In addition, people under poverty line could not afford to buy a conventional fridge. She emphasized the importance of finding unique approaches that adequately serve African BoP communities. On this ground, she pointed at the necessity of exploring possible use-cases for the business model success[11]. Meanwhile, she shared available business reports about the African market.

She showed an Excel document with project stages, telling there were four *gates,* in which the business managers evaluated the progress with respect to the project objectives (Figure 28). Passing in a gate meant that the project had achieved the goals and it was ready to pass on to the following stage. She clarified that the ideation gate aimed at showing that the product concept was technically feasible. The goal of the second gate, market research, was demonstrating that the product concept could solve a prevalent problem, and the quantitative research and facts supported it. In the third gate, the prototypes were going to be assessed for technical, and customer-centered aspects the product was aiming to solve. Finally, if the project would pass the remaining three gates, it was going to be mass

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in creating an initial understanding of the problem scope and getting acquainted with the approach of the product development team.

[11] I did not participate in the business model development thoroughly; on the other hand, I took part in examining potential use-cases, which would inform business model development. From this day onwards, the research about foods that were vulnerable to harsh climate conditions gained importance within my research tasks in comparison to other research directions. Meanwhile, the project leader kept the project team updated about other products and competitors in the market and business model possibilities. The discussion of the adoption of alternative technologies aroused during the prototyping process. However, alternative technologies fell off the agenda due to the low-cost strategy and projected context mismatch.

manufactured. After clarifying what these gates meant, she added that the team had passed the concept ideation phase, and the project was going to be assessed for the market potential analysis soon. Hence, at that time, they were working on the prototype, along with the recently started market research.

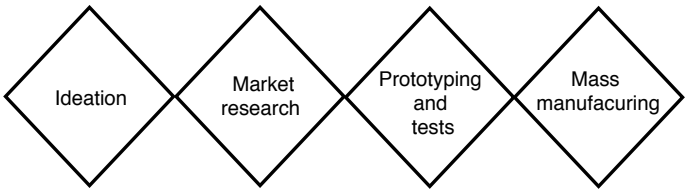

Figure 28. Representative model of the product development phases.

After explaining the gates, she introduced the members of the product development team. She mentioned the background of the core team: herself with an electric and electronic engineering Ph.D. degree and the design engineer with a mechanical engineering background, who was a Ph.D. student at that time. There were also two academicians in Turkey consulted for concept simulations. She expressed the rest of the project team was affiliated to Germany-based Corporate Innovation Department including herself as the project leader, one responsible in Munich, and me, the UX researcher, who from now on would be working for the department from Turkey (Figure 29).

She pointed out the gaps in the team's knowledge that I would contribute with research:

- the number of people living under the poverty line,
- types of food, which spoil due to compelling climate conditions and lacking useful storage products or systems[12],
- products used on a daily basis and the competitors if available[13],
- feasibility of alternative technologies in Africa (i.e., solar technology),
- business models for Africa,

[12] I noted that we should also evaluate whether there is a real need for keeping foods fresh for extended periods or not, by looking at people's traditional practices.

[13] The project leader introduced a local solution as the foundation of the product principle, i.e., pot-in-pot cooling.

- supply chain,
- university collaborations[14].

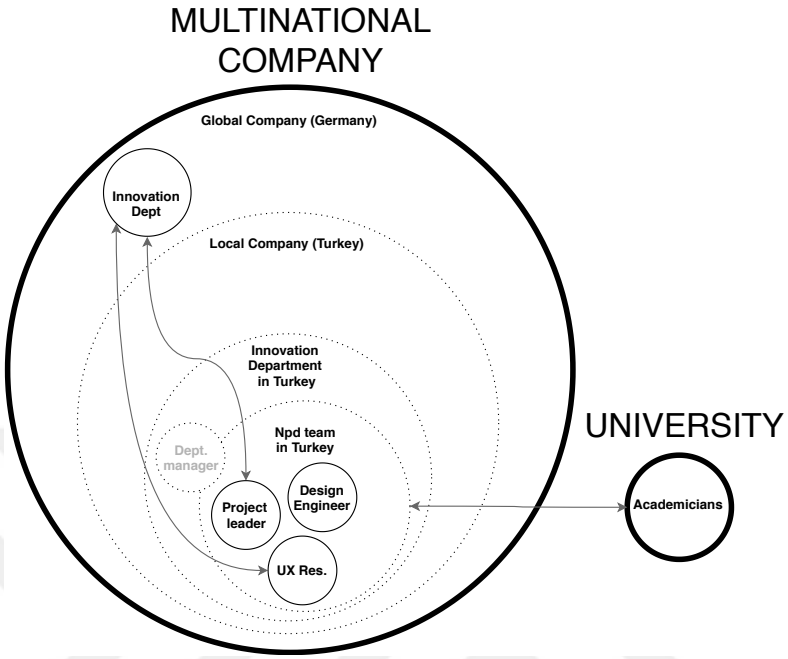

Figure 29. Initial product development team in Turkey.

She also commented on the challenge in reaching the exact numbers of people under the poverty line, because, they had been informed about the cultural tendency to hide socio-economic status among African people. Hence, the nature of the data was grounded in estimations. In line with this, they needed a means for data triangulation.

In this first meeting, I understood that the organization's standard product development process approach had been built on the creation of a product concept of which feasibility considerations were resolved, and its development process planning was done thoroughly (See 7.3.4. Product Development Process Methodology for Designing for the BoP). Coming from a tradition in which user research was carried out to gain empathy with people prior to product ideation and prototyping, I had difficulty in formulating what my tasks would be initially.

[14] The project leader informed me about an academic collaboration project intended to carry out with the industrial design department of a private university in Istanbul. The project theme was off-grid solutions for camping sites and refugee camps.

Moreover, having an engineering background, the initial expectations from my contributions were shaped on a wide range of topics rooted in the field of industrial engineering and management. Nevertheless, I expressed the skills that would benefit the BoP product development and research process were related to user research (UX). The project leader informed that they did not have any intention of conducting field research other than a marketing survey in Africa at that time. Thereupon, I explained user research to take place at the beginning, middle and end of the product development process primarily to understand people's needs and behaviors, reveal perceptions about a product's form and function, or improve a product's usability. I pointed out the user research approach was different from market research on the grounds of research methodology and outcomes. I emphasized the importance of, for instance, conducting ethnographic research, in obtaining quality results and gaining real empathy with unfamiliar people. After talking about the overall skills of the team, and me explaining what a UX researcher can contribute to the design process, she expressed her interest in learning more about user-centered approach.

At the end of the first day at work, I was briefly informed about the resource and capacity allocation in terms of the time plan, project team formulation, and the product development approach. Moreover, I was familiarized with actors within the problem setting, collaboration means, strategies in business, available user data type, product innovation and working principle, technical opportunities, challenges, and more. Figure 30 shows a number of topics raised during the first meeting. The figure is formed by applying content analysis to the notes.

In this section, I revealed the immersion process starting with the communication between the company and the academic institution I was affiliated to. I presented the expectations of the company from a T-shaped employee, my initial perception regarding the problem domain, the resources and understanding of the product development team for the BoP product development, and the emphasis onto the user-centered approach to guide my practices in the following phases. The next section will introduce the necessities in playing certain human-centered designer roles along with immersion in the product development process.

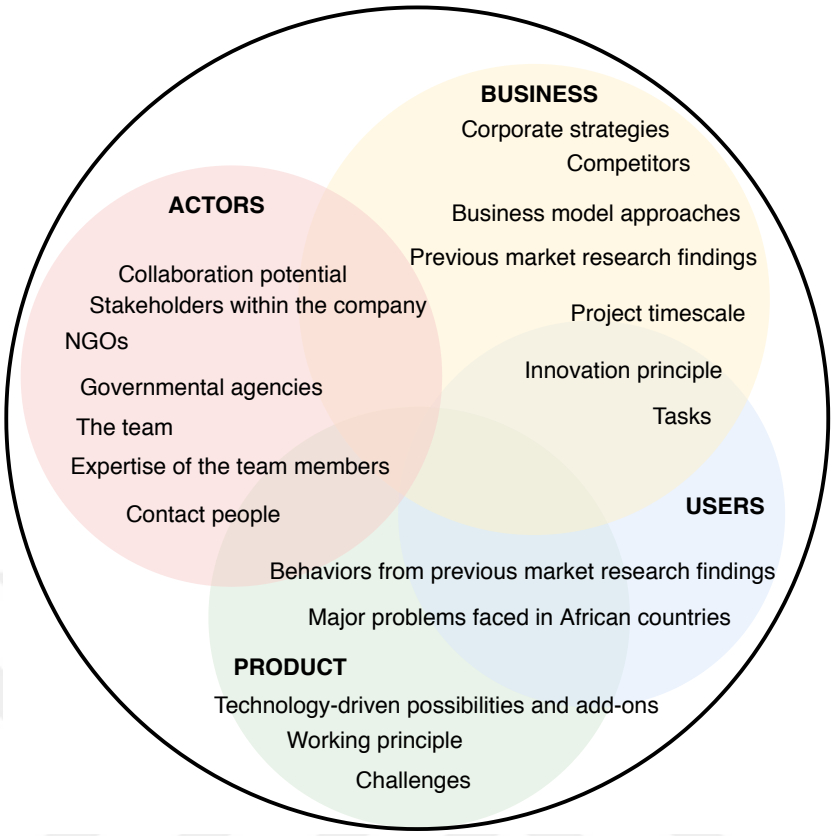

Figure 30. Cognitive map 1: Familiarization with the team's approach of the product development process on the first day of immersion.

6.2. Engagement, Framework Creation, and User Research (February-May 2016)

My initial impressions were that the nature of the information the team had about the African market was dispersed, which needed triangulation and systematization[15,16]. Also in line with this, the team was in search of collaboration partners, NGOs, governmental agencies, or African students, to explore and validate the needs and problems of African people (Figure 31). Hence, my first task became the mediation of communication with these institutions through e-

[15] This section is written by referring to the e-mails, memos in Journal 1, Materials 1-12, and Tasks T0-T8.

[16] The project leader was in the opinion that the needs and problems should also be cross-checked in order to validate decision making due to the challenges of reaching accurate information about Africa.

mails or face-to-face contact[17]. On that day onwards, I began searching for governmental, non-governmental, and academic collaboration channels in Ankara, Turkey. I was provided with an e-mail draft in Turkish and English to send to convenient collaboration partners.

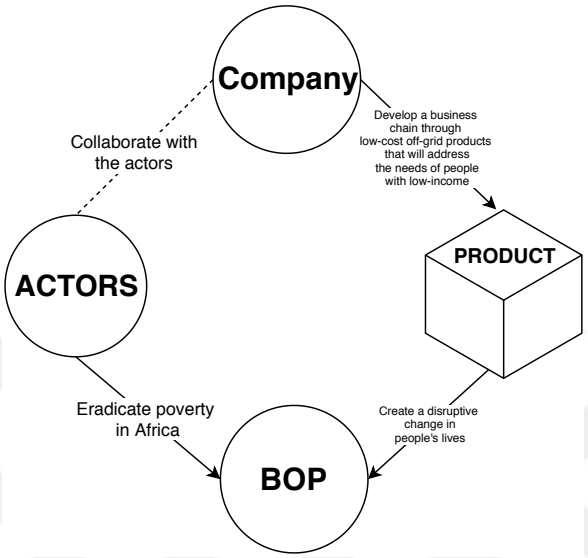

Figure 31. Collaboration in the product development for the BoP communities.

In the following weeks, I reached several governmental and academic institutions in Ankara through phone calls and e-mails[18]. On the other hand, they were not willing to collaborate unless the project was supported by a governmental organization. Due to this end, I suggested the project leader to reach academicians in Africa, whose account I assumed to be valid and informed (i.e., University of Nigeria). Although I identified a number of contact people through their academic research on African people's needs, we preferred contacting *institutions* due to corporate regulations. Meanwhile, the project leader and the team in Germany reached non-governmental organizations and got information about the problems

[17] The project team showed a number of actors they had reached until that date. Previously, I had been considering global collaborations as an action, which needed permissions and a plan. The spontaneity and the ease of communication through e-mails were very surprising. Correspondingly, the team's encouragement on me to keep communicating with potential collaboration channels made me feel empowered from the first day at work.

[18] Ankara University Center for African Studies, Turkish Cooperation and Coordination Agency, Directorate of Foreign Relationships, Directorate of Middle East and Africa, Nigerian Embassy.

and opportunities in Africa. The project leader kept me updated with frequent alignment meetings through Skype and shared information on hand.

Through these two weeks, alongside the global inquiry about the collaboration channels for knowledge creation and validation, I continued examining the business reports provided by the team. My knowledge about the problem context was being formed in bits and pieces mostly through the lens of market research (Figure 32). I was being involved in many topics ranging from possible market segments to target customers, and product price range. I was receiving information simultaneously about the company strategy and objectives, market segmentation, product requirements, previous market surveys, user behavior in Africa, and collaboration channels for knowledge creation. I was providing some hints in my notes about business models targeting African countries. We were reviewing non-governmental organizations across the world with the mission of fundraising and social innovation based on our collaboration potential (e.g., Practical Action, Alaska Sudan Medical Project, Humanity First, Movement e.V.). I was examining active projects for global collaboration (e.g., World Bank).

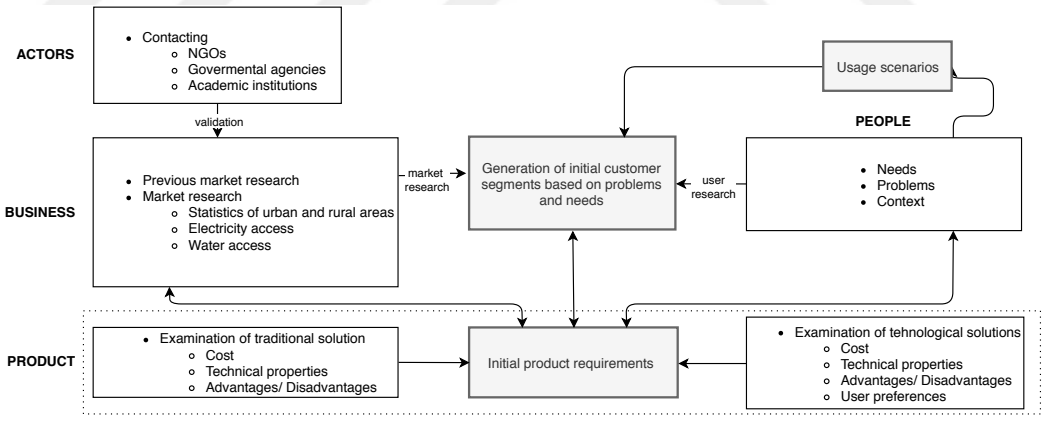

Figure 32. Cognitive map 2: Familiarization with the team's approach of the product development process in the second week of immersion.

Meanwhile, I was assisting the product development team on the domains which would inform the business strategies and scouting process. Correspondingly, I reviewed the official statistical databases (e.g., World Bank) and information providers (e.g., Rockefellar Foundation), to reach the food spoilage rates and harvest information, so that the market segments could be determined. Other than

these, I instigated a usage scenario inquiry. In order to formulate usage scenarios for the product, I started exploring traditional methods of food preservation through blogs. I realized that I needed information about the ways of living in urban and rural areas of Africa, the cultural characteristics of people, livelihood strategies, and economic activities to make sense of usage scenarios. I also considered the further research needed to be carried out on African people's typical diet, the means people use for transportation, the how's of living in a typical African house and identification of house characteristics, and finally, the ways indigenous people explain their quality of life-related needs and problems.

Through these two weeks, I felt the need for a systematic approach for building these information bits into coherent knowledge on the problem context[19]. For this reason, I was approaching the problem area using systems thinking, and I was taking notes on, for instance, what it means to cool foods, who needs it, when/why/where/how, and whether one needs it or not. As we could not spend time on it due to project agility, this systematization process remained as a personal effort.

Again, based on the same necessity, I kept working on the product development framework, which I began designing in the first three days at work, to formulate the determinants of the product development process to ensure how a user-centered approach systematically fits into this process (See Figure 55 on p. 230). I needed the framework, which included the stakeholders and objectives, to guide my research process, communicate the objectives and the roles within the product development team, and make the communication between myself and the team easier. As we were mostly communicating the insights through Skype meetings, we needed something solid to be able to communicate effectively [20] [21].

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[19] In the onwards, business context mapping tools seemed to be effective to reveal available knowledge and build relationships in a systematic order.

[20] Being from the METU and industrial design department, which is a prestigious university and a department with notable achievements in the worldwide listings and having the reference of an esteemed faculty member of METU initially formed a very positive perception about me as an employee. Additionally, the first days, which allowed me to bond with the members of the department were impactful. The department was in a transitioning process; the new department manager was recently appointed. I met the members of the department in a full-day workshop at a

Having no previous experience in business model development or BoP problem domain, I decided to conduct a secondary (desktop) qualitative research about the needs and problems of people living in Africa so that I could make sense of the available data and their connection to lead our practices. I also believed that rather than building our insights through the market research, which were slightly numeric, a qualitative research was what was needed to familiarize the team with Africa on accounts of gaining empathy and responsibility. I did not want the team to see people as numbers; but as people with stories. In this direction, I began

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hotel in İstanbul. We spent the day working on the improvement of the internal processes and there I was able to contribute to the roadmap. After the workshop, we ate dinner all together. This incident helped me to bond with other employees. I had an opportunity to familiarize myself with people and their personal lives, talk about myself, my values, my background, and awareness concerning topics such as happiness. Learning that there were other METU graduates in the same department, I quickly became part of the group and felt lucky because they were welcoming. I needed to maintain the positive relationships I was able to establish with the department members.

[21] Building trust was necessary to facilitate good communication between the team members. Ensuring trust required an extraordinary effort on my side because I was working home-office, along with quite different tasks and responsibilities. It was something the organization was not familiar with before working with me. Given that I was working home-office and most of our communication was through e-mails and Skype sessions, I had to more than perfectly understand the objectives of the stakeholders. Although I was able to concentrate very easily because nothing was distracting as in an office, I needed to listen very carefully, grasp the insights very quickly and ask the right questions to empathize myself with the objectives. I also had to express myself beautifully in text and while speaking so that I could convey the message without any meaning loss. For this reason, planning became a crucial aspect of communication; I was planning the questions I needed to ask and the things to talk about, beforehand.

Due to working home-office, the first few weeks were demanding on learning the technical necessities without experiencing any problem. I aimed to ensure a working system in my living context. This meant that I needed to take care of my work computer in times there was an update, which was usually taken care of by IT, and there were frequent corporate software updates I had to make in order to keep the computer safe.

In addition to this, I had to cope with the problems that might create barriers in Skype meetings. Since I did not want to experience drops, I frequently measured the internet speed. I had to ensure the surrounding was quiet, and nothing could intervene in the video or voice call. Although I took precautions in order not to experience any such problems and I only experienced only a few issues, it was very stressful to carry out an isolated call due to the possibility of an unexpected phone call, a doorbell, noise from upstairs, children playing outside or our meowing cat. This stress was also caused by the fact that I was the only person working home-office in the entire organization. And, I thought my colleagues would not be able to empathize themselves with me very easily.

The times I was in the office needed to be very productive; hence, I was planning what to discuss from earlier and coming prepared. I was visiting the office in times it required working together. I, by being in the office, was able to empathize myself with the work schedule of my colleagues. Being there was very beneficial, especially for the team dynamics and building trust with them or sharing their stress. Nevertheless, the office times were not that productive because there were many Skype calls that the project leader needed to take. Sometimes, it was even better when I connected from Ankara, I thought because we were not distracted by other Skype calls.

searching ethnographic videos about African people's ways of living, and photos of people living in the urban and rural areas of Africa (such as Jclove, 2005; Interview Clips & More, 2011; New Atlantis Full Documentaries, 2014).

The more I was immersed, the more I realized the problem domain was extensive and multi-dimensional. I limited my analysis to one country with the highest population number, which was Nigeria. In this respect, I reviewed the academic literature on socio-cultural characteristics, concerns of economic activities, and economically active population by sector in rural areas (such as Woldenhanna and Oskam, 2000; Awoyemi, 2011; Akpor-Robaro, 2012). Moreover, I wanted to keep the project team updated about the way design literature embraced the BoP problem area. I listed the suggestions in the domain as:

- *"Bop studies in design exist, but they are limited in number.*
- *The studies report on the diverse characteristics and needs of African BoP communities.*
- *Such studies emphasize the importance of co-design to better address the needs of the people*[22]*.*
- *Co-design workshops should be designed in a simple way so that everybody can participate easily.*
- *There are methods for the facilitation of (creative) sessions by the design researcher, the pool is being formed"* (In Ongoing Research Data for [Confidential Project Name], presentation by the Researcher, March 10, 2016).

Finally, I expressed the necessity to examine not only the way product design should be, but also the experience of the product in the long-term, which would influence the user research design we would carry out. This suggestion was due to the company's strategy of crafting the first positive impressions for brand awareness in the African region. I believed a brand could only create a positive impact if the product could be experienced positively. Thus, I voiced the significance of carrying out a user experience research in achieving the strategic objectives.

[22] This was the second time I communicated the need to carry out a field study in order to make meaning of the insights and develop a product together with African people so that their needs are addressed.

Mentioning the necessity of a user research with potential strategic benefits, accompanied with the literature, was going to impact the team's decision in the long-term to include African people in the product design process. Moreover, by communicating my interest in researching and applying creative facilitation techniques, the project team began to develop interest towards the design thinking approach.

My human-centered approach and the way of looking into the problem area was entirely different from the team. In this, the literature driven approach was creating an impact on the team's attitude towards the problem area, while building trust towards my expertise. Overall, the qualitative research was the turning point in influencing the approach of the team for embracing the project insights in a more human-centered way and impact the decision-making process to conduct a user research in Africa.

Subsequently, the project leader and I formulated the second version of the customer segment and value proposition statements through a human-centered lens by making meaning of available data and user research. We examined the economic activities in Africa to describe potential customer segments and usage scenarios. This was going to be an iterative process, and we were going to carry out market segmentation and estimations all the way until the prototyping phase ended (Figure 33)[23].

The tradeoff between the value proposition and the business development appeared here for the first time. As one of the objectives of this project was to create a business chain, and the company did not have a business network in places where the product concept would create value at that time, we were going to start reviewing the target countries for their business potential and continue through the product development process. Hence, determination of the target countries, market segmentation, and the customer segmentation were a challenge because they were bound up with the company's resources there.

[23] For value proposition, we benefited from a business ideation tool designed by Business Models Inc (BMI, 2019). It also had an impact on the systematization of the insights we had.

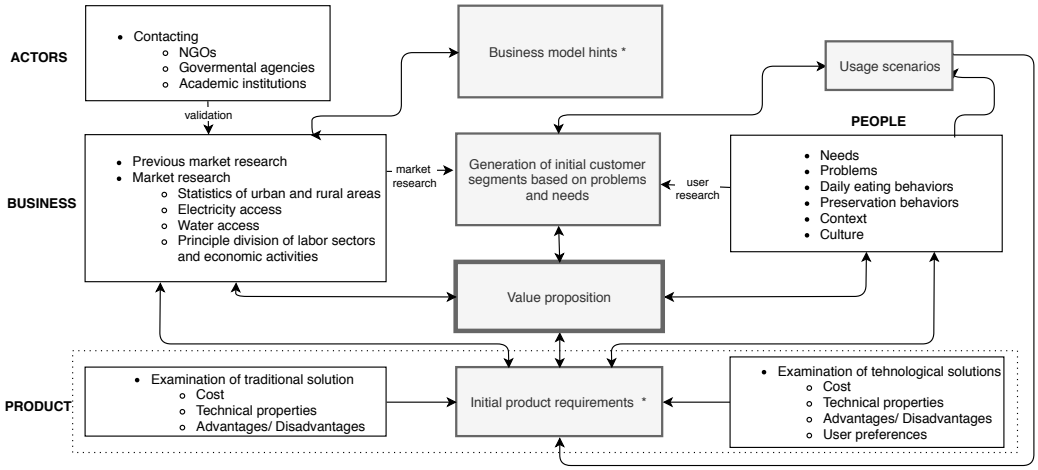

Figure 33. Cognitive map 3: The topics immersed within the first month and their influence onto the knowledge accumulation.

In the following days, discussions on what we could and could not obtain through field research gained acceleration. The project leader and I had different views about the target market segments and the product's fit in their context. I believed we could decide on these aspects confidently after gaining empathy with a field trip or ethnographic research conducted on our behalf. I also mentioned the field research, having significance in the formulation of the product domains that would be worked in the future besides the advantages of the triangulation of the problems and needs. Hence, the project leader proposed to start with a low-level qualitative research in Africa. However, before that, we had to find a reliable research agency. Finding a trustworthy research agency was a challenge given that the collaboration with the research agency had to satisfy the company's corporate regulations. Besides, fraud was an aspect we were warned about. Due to this end, we contacted a global research agency, having a local network in Africa. After several e-mails, we learned about the research types they were able to support. We decided to conduct a comparative photo survey research considering the budget and target of the research, in order to triangulate the user and market research findings. The study was going to be based on photographing the households, and asking people a few questions we provided earlier on their daily problems through the agency of a research institution.

After the decision on the photo survey, communication with the global agency gained significance. The project leader asked me to develop a study brief to share

with the global research agency. I was aiming to formulate the research design and questions in line with academic methodology. However, the team had no further expectations other than agility; most of the tasks had to be completed in days even hours so that agility could be ensured. I needed some time to internalize the expectations[24].

> Normally, I have to carry out further research on the research design and research method, but I can write a short text in line with our [the team's] expectations [from the research agency]. I will elaborate [the brief] later on as we progress then. I will try to send the short brief tomorrow during the day. (H. Işık-Tosun, personal communication [E-mail], March 7, 2016)

I was prone to design an extensive brief explaining why we needed this research, how our research questions form, and with which method we can carry it out, even by researching the cultural aspects (e.g., six dimensions model by Hofstede). However, the team was expecting a brief that explained what to do in shorter terms so that they could pass it on to the stakeholders and act instantly. I observed this as a learning state in gaining empathy with the needs, objectives, and the way of doing of the project team. For this purpose, observation, listening, and asking questions gained cruciality within my practice.

I developed the research brief with an extended and shorter version to guide the research process, communicate the expectations of the team and depict the expected outcomes. After agreeing with the global research agency, the extended brief was shared with the local contacts of the global research agency. The brief created a positive impact both among the team and the local research agency and was used afterwards in several occasions[25]. The study began within a few weeks.

Right after, the project team decided to conduct field research in Africa with the support of the global business decision-makers. This time, regarding the scale of

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[24] I was assisting the project leader with the research terms so that our objectives could be communicated accurately. The conflict I felt about confidentiality appeared here for the first time while working on the research brief. This state triggered me to ask more questions. I was not sure whether anything involved any confidential issues or not. As a response, I was informed by the project leader that anything concerning the product had to be kept secret before the product was patented.

[25] The brief was also utilized during the usability research conducted in March 2017.

the research and associated decision-making, we contacted the marketing department[26]. I designed the research brief, together with the research questions and expectations from the field study. Based on this document, the marketing department contacted several global research agencies with local research agency contacts and received offers. In this duration, I frequently visited the office in Istanbul, to evaluate the offers together with the project leader and help her choose the best alternative among these offers considering research effectiveness and details. Respectively, the marketing department representatives contacted an established global research agency to carry out our field research. Then, our preparation for the field research began.

An essential feature of our research was going to be the prototype. However, the product form was not an aesthetic decision to make, it was rather a technical problem which needed further investigation, simulation, and tests along with material innovation[27]. Since the tests were going to be carried out in the following phase, we planned to take the minimum viable prototype with us to take people's initial opinions about. The prototype was being designed by the team's design engineer (mechanical engineer). Until the field research preparations in Istanbul, we did not work much together. I only saw the end-results of the prototyping process. However, I felt the urge to decide on some of the aspects of the design together as they might influence people's perception of the product on the field. While I was in the office, the project leader and the design engineer were choosing the color of the prototype, and I intervened in their decision-making, telling my opinions about the color of the prototype, with reasons rooted in distant visual ethnography. This was a turning point for us to decide on some of the

[26] I firmly believed that it would benefit the process of gaining empathy with people in Africa while increasing our confidence in decision-making. The project leader asked if I would like to conduct interviews in Africa. Having no experience in intercultural research before, and reading the papers indicating that it needs tailored techniques to communicate with African people, and there could be operation challenges, I suggested getting support from the marketing department. And the marketing department contacted the global research agencies.

[27] I had told the project leader that it would be nice if we could show a prototype during focus group sessions in order to take people's initial perception and receive people's suggestions to improve the prototype. This way, prototyping for the field research gained acceleration.

design aspects together in the afterward. The team began to take my opinion about the prototype design, such as shape and color.

We were experiencing product development as a multitasking process. We received the results of the comparative photo survey just before the field trip. The photos were taken from ten households, in which eight of them were in the developed country, and two of them were in the underdeveloped country in Africa, due to the challenges of reaching the contact people in the underdeveloped country. The results were shared as a photo file and an excel document. The budget of the photo survey was very affordable and surprisingly effective to triangulate the secondary research insights about the target countries. I examined the results and prepared a document which brings the questions, answers, and photos together. By this means, we had an overall picture of the needs and the problems. The results of this survey had an impact on the formulation of the target countries.

The multitasking was not limited to the research related tasks; we were also planning and contacting stakeholders for further collaborations. Just before the field trip, we visited the academic partners at the industrial design department at Istanbul Technical University and expressed our intention to carry out a collaboration project with them.

This section demonstrated the process of *learning* by referring to the data collection and validation channels. It presented the way *doing* happened on grounds of the tasks of the product development team, and the tools designed to embrace an ambiguous design process. Finally seeing designer as an agent of change (Price et al., 2018), it showed how user-centered approach increasingly gained significance in leading the practices of the product development team. On this ground, the next section reveals the experience at the field, and the contributions of the designer in gaining empathy with users in a systematic way.

6.3. On the Field for Observation and Focus Group Discussions (May 22-29, 2016)

Safety was a significant concern even before the field trip and in research design[28]. Although at first, we wanted to conduct individual interviews with people in rural areas of Africa, we decided to carry out focus group discussions (FGD) regarding the safety of the participants and the research team. FGDs were allowing research to be in a controlled research laboratory. Therefore, it seemed an efficient research method ensuring safety, and for decreasing the time it needed to conduct research with plenty of participants. Hence, together with the global research agency team, we decided to carry out FGDs. As a product development team, including the project leader, the design engineer and me, we were also going to observe the focus group sessions in Nigeria for one week to make meaning of the results more appropriately.

> We are finally on our way to Lagos, Nigeria. It seems like almost all passengers are Nigerian, and there are only a few foreigners, including us, who will take on this plane. Moments ago, there had been a slight conflict at the gate queue between a Nigerian man and a flight attendant. As we came closer, the flight attendant was into us [the team], asking why are going to Nigeria with a surprised tone, and adding "I would not go if I were you." Her reaction was unexpected… (H.Işık-Tosun, personal communication [Journal 2], May 22, 2016)

Being shocked for a moment, we did not know what to expect from this journey after hearing the words of the flight attendant. We just told her that we were an innovation team working for the good of African communities. We did not ask the reason for her reaction. However, one thing I was sure of was that it needed empathy to communicate with a person from another culture. As we moved to the plane, I took notes on my observations:

> I have been observing Nigerian people from the moment I arrived at the airport gate. These Nigerian passengers seem to belong to an upper-middle or high-income socio-economic class. By looking into their appearance, they must be returning from a religious

[28] This section is written by referring to the e-mails, memos in Journal 2, Materials 12-13, and the Task T6.

> event taking place in Turkey; they have those name tags. Their clothing is gorgeous; they prefer vibrant and earthy colors. Some men are wearing hats, while women are wearing lacy and patterned clothes. Women are also wearing traditional headscarves... They are speaking quite loudly and laughing frequently. (H. Işık-Tosun, personal communication [Journal 2], May 22, 2016)

From the moment I was on the plane, I felt like all my senses became activated, trying to capture every tiny detail I saw. Moreover, it continued through the field trip.

> My seat is 35A. A few minutes ago, they disinfected the plane with a spray through the corridors. There are people lying, sleeping next to our seats. The person next seat is frequently intervening my personal space. He has not accepted any food or drink from the cabin attendant. He gave me the water of his, and only took the sandwich and has not eaten yet. He might be fasting. I have seen the young lady next to him writing a diary... maybe she is keeping a notebook to learn reading and writing? (Her handwriting is huge!) […] Before landing, we put on our mosquito repellent sprays as advised since any mosquito might be infected [..]. After landing, we have reached the airport. The weather is very humid, and I can smell must in the air. The officials examined our documents for yellow fewer. Then we waited in the queue for the passport control […]. I am again seeing people wearing gorgeous clothes! High fashion and well-known brands! (H. Işık-Tosun, personal communication [Journal 2], May 22, 2016)

The marketing research we examined before coming to Nigeria were reporting the biggest problem of Africa as the despair caused by poverty. However, now, by being at the field, we began to realize they were prejudiced. Regardless of their financial state, people seemed happy, well-dressed, and very self-confident. From the moment we landed at Lagos, we came to realize that it was a metropolitan city. At first sight, and until seeing slums in Lagos, we believed Lagos was not much different from some parts of Turkey.

Not long after, we also came to realize that the lacking infrastructure was the major problem affecting all. It was causing unstable electricity, limited water access, or severe healthcare problems, impacting many aspects of people's lives concerning basic needs. Nevertheless, people had their own tactics to overcome the challenges caused by infrastructure problems. These tactics were not easily visible through the secondary research channels.

> The airport is full of posters warning about the corruption and ways to defeat it. We must be very cautious and be together all the time […] After exiting the control point, and exchanging money, we met the young researcher of the local research agency waiting for us at the entrance of the airport. (H. Işık-Tosun, personal communication [Journal 2], May 22, 2016)

Through the trip, our security turned into a significant issue. Although the primary aim of this trip was carrying out focus group sessions, and in times excluding the focus group sessions, we aimed to observe the surrounding, we were never alone, traveling the city with local guards from the local research agency and for most of the time by car for security reasons. Our hotel was located in a safe area of Lagos, and it was chosen from the pool of places to stay due to being protected by armed police.

In the following days, we learned that the challenges were not limited to this. Local research agency members warned us to keep in mind that there might be some incidents of begging for money, we should not respond to them as they might carry the intentions of robbery. Besides, we had to be careful about using our smartphones while taking photo in public places, official districts, or of people we saw without their consent. Additionally, we should rather not get on a tuk-tuk (tricycle) because traffic accident rates were high. Moreover, they recommended us not to travel alone after dark, as the streets might be dangerous. These aspects were causing us to stay together and be with the local research agency members all the time.

On the other hand, the accompaniment of the local research agency members during the entire trip was relaxing. During marketplace visits, the local research team expressed that due to being foreigners, local people might not approach the team positively unless they were convinced that the team was working for the good. However, during marketplace visits, when local research agency members introduced us to the local community as innovation makers for Africa, the community showed respect and expressed gratitude towards the team. Even, some local people wanted to take a photo together (Figure 34).

Through the field trip, we observed people, their environment, the products they use to make meaning about their surrounding (Table 16, Figure 35). I took several

photos and videos and discussed their implications for our project with the team, inspiring others to do the same based on the guide I prepared earlier (See Figure 53 on p. 225). Although the team was not able to utilize the guide, they also began to look at their surrounding knowledgeably. Meanwhile, the team's trust in my expertise increased because I was looking into things with an informed eye.

Figure 34. Local people posing to the team.

Table 16. Urban observation.

The experience of the city	**Habit and taste**	**Products**
• patterns • noises • weather • smell • foods and drinks on the streets	• outfits, color and fit • activities • behaviors • materials and objects • unique/interesting materials and objects • brands • graphics • signs • hygiene • order	• products • storage facilities • protection facilities • threats

Figure 35. Field observation.

Accompanying observation, in focus group sessions, various topics regarding typical daily diet and habits, food consumption, and preservation methods were discussed. FGDs took five days of 16 sessions with 60 participants. In each session, 4-6 participants were available. The sampling of FGDs were determined regarding the customer segments and product-related hypotheses (value proposition). People's daily eating and preservation behaviors were now more precise with the help of focus group sessions, as this type of information was the most difficult to reach. Additionally, the perception of the initial prototype was assessed, and the participants' thoughts on the design and further developments were taken.

During focus group sessions, because both the research team and the participants needed to be safe, the participants were gathered in a controlled research laboratory. The laboratory was in half an hour distance to the city center, in an apartment on the third floor. It had a focus group session room with one-way

mirror and an observation room with digital audio/video recording, and a speaker (Figure 36). Participants waited for a period of time in another flat before they were invited in the laboratory. Climatic conditions inside the apartment was a challenge during the sessions.

Figure 36. Focus group discussions.

Within the FGDs, I felt as a bridge between the team and Nigerian people, and the team and the global research agency representative. I was an optimist, trying to capture what these discussions could imply for our product design. I was taking notes during FGDs, comparing, and analyzing data simultaneously. I was observing whether there was any information loss during moderations and formulating spontaneous interests of the product development team into communicable research questions. I was working together with the global research agency representative to modify the research procedure in times anything was unclear, or if we had specific research questions. The global research agency representative was training the moderators on the aspects that required further probing, to which the product development team paid attention. She knew how to communicate our expectations and resolve conflicts about the focus group

sessions instantaneously. This way, we were able to intervene in the process, and improve the research procedure to probe certain aspects in a more in-depth way. Hence, focus group research brought along flexibility.

Working with a global research agency was what was needed to cope with the challenges and ensure research effectiveness. With their comprehensive expertise, research and outcomes were kept in line with the product development team's expectations. Meanwhile, global research agency partnering with a local research agency ensured the participants' and our safety and decreased the communication barriers with local people. On the other hand, it also potentially caused the barrier of meaning loss due to availability of intercultural communication with many stakeholders involved (Figure 37).

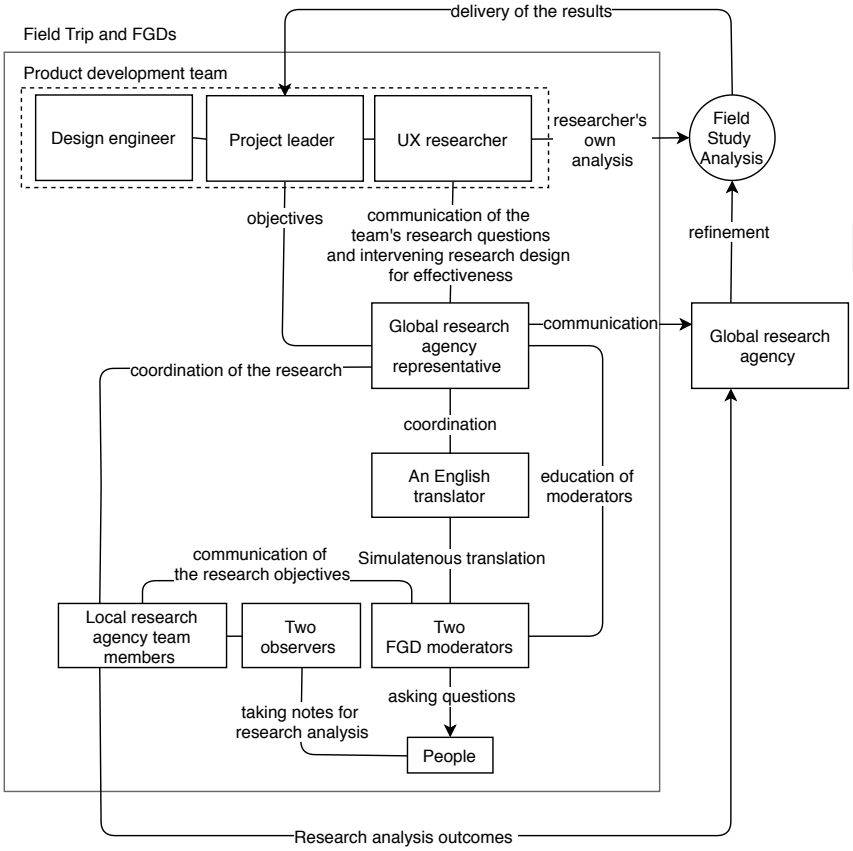

Figure 37. Involvement of many stakeholders in communication during FGD.

The focus group sessions were carried out with two local FGD moderators, two observers from the local research agency who analyzed the sessions simultaneously, one local British-English translator, one responsible from the

global research agency (market researcher), product development project leader, design engineer, and me, the UX researcher.

Two focus group moderators could understand different dialects of Nigerian English (Pidgin such as Hausa, Yoruba, Igbo). However, occasionally, the moderators were not able to communicate effectively with some participants because of their rare dialects or education level. Besides, although we were in an English-speaking country, and the team members were speaking English to full professional proficiency, the dialectic differences made it very difficult to understand the discussions without translation. Due to the challenges of incomprehensibility, the local research team hired a British-English translator immediately. However, this time, the translation raised concerns because we identified some interpretations instead of translation. On account of positive expression frequency, the translator was requested to translate directly, by not adding any interpretation. Meanwhile, body gestures of the participants were also observed in parallel with the discussions. In response, the product development team was informed that Nigerian people generally approach innovations quite positively. At this point, the global research agency responsible modified the research tools and methods in collaboration with me. Moreover, the global research agency responsible instructed the moderators on the aspects that required further probing, to which the product development team paid attention.

Although we experienced suspicion at first, we got used to making meaning simultaneously gradually through listening to the participants and the translations, and by observing participants' body gestures. The product development team was informed that Nigerian people generally could approach innovations quite positively. The local research agency had warned the product development team not to contact with the research participants due to possible preconception. However, after FGDs, some of the participants wanted to meet the product development team to tell their impressions, and to tell that the product concept was entirely in line with their daily lives and wanted to buy the product immediately if it was sold. The team's motivation increased apparently when the research participants wanted to meet us and buy the product.

"This product is magic!" (One of the participants during the FGDs).

Other than research-related challenges such as meaning loss, one should also mention the wellbeing related challenges, which are usually not discussed transparently, however, became an issue once in the field.

We were lucky to carry out focus group sessions in a research laboratory with convenient facilities. Being with the necessary equipment, we believed it was one of the most favorable laboratories in Nigeria; there were a one-way mirror, an observation room with digital audio/video recording, and a speaker. However, the climatic conditions inside the apartment was a challenge, the moist and heat were making it very difficult to breath. We were frequently feeling suffocated as much as the research participants. Participants were offered drinks to chill during FGDs. Besides, although we did not want to turn on the air conditioner in the room due to the health risks, we needed to turn it on, to be able to breathe. Nevertheless, our meticulousness decreased, and we got used to it.

We were warned not to eat or drink anything open based on the risk of diarrhea[29]. Hence, we were avoiding lunchtime or eating snacks we brought from Turkey. The local research team members were offering hot drinks and lunch with insistent hospitality, expressing they wanted us to taste traditional Nigerian food such as yam. We did not want to offend them because they were very kind and caring. Eventually, we ate one lunch with them. Nevertheless, on their observations, after a few days, they began to offer us cold drinks in closed bottles from well-known brands such as Coca Cola.

Additionally, to prevent diarrhea and other possible health issues before happening, we needed to take a few medicines every day, put on mosquito repellent sprays, and wear long-sleeves not to be bitten by an infected mosquito carrying yellow fever (Figure 38). I took a strong antibiotic and used the spray through the field trip. Even, this was not comfortable for me. After I returned to Turkey, I experienced an allergic syndrome due to medicine dosage. Although it was not a serious problem and passed within a few weeks, I thought not everyone

[29] Especially raw vegetables, and some cooked vegetables such as tomato.

could make it. Additionally, after visiting Nigeria, I learnt that I would never be a blood donor in Turkey anymore.

Figure 38. Medicine for the field trip.

Other than our diet and preventive actions, clothing was an aspect which needs mentioning. I wore a long-sleeved shirt and a long comfortable outdoor pant in earthy colors for almost the week. My outfit was mosquito repellent which took the local research team's attention, expressing that it was a safari outfit, and they would never wear clothes more than a day without any washing. Indeed, their clothes were always clean and neat[30].

Although not mentioned among the major challenges (Figure 39), fastidiousness about health-related concerns was a barrier in building sympathy with the members of the local research agency, because following the health-related advice[31] was preventing us from doing a set of things that the local research

[30] Friday was a casual day in which people wore their traditional clothes. Our driver wore traditional white clothes which surprised us with its whiteness and lacking any wrinkles. With this awareness, we decided that the laundry needs further investigation by the product development team. After the field visit, we determined the first collaboration topic as laundry washing in Case 5.

[31] The advice was given by the company doctor and the center for travel health of Turkish Ministry of Health.

agency members were offering us, due to their risks. We were mostly having to say *no thank you*, bringing into doubt if we were offending them. However, local research agency members were very amicable and outgoing. In times excluding the sessions, we experienced positive interactions, chatting with each other, which built trust and sympathy. At the end of five days, we were feeling like a family.

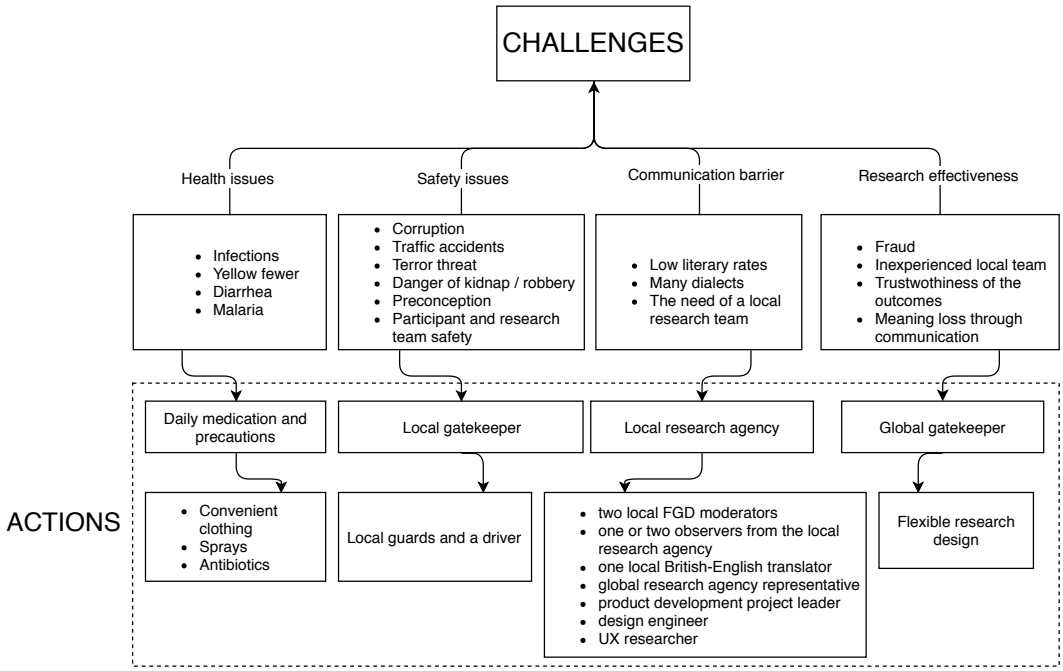

Figure 39. Challenges of carrying out a field research.

Overall, the field trip and FGDs were eye-openers. They were useful in gaining an in-context understanding of Nigerian people's economic activities, street life, visible brands on the streets, and some cooling-related behaviors. Moreover, they were meant to reveal the nuances and fallacies in our understanding of the BoP phenomenon. For example, desktop research for Nigeria was revealing *pot-in-pot* as a prevalent food preservation method. However, the field observation showed that the method was only familiar to people living in rural areas, whereas it was replaced by plastic containers in urban areas. Another example was about water access. Although desktop research presented access to clean water as a problem, focus group sessions and observation of people showed that there was an informal water network provided by street vendors. "Sache" waters were on service almost in every part of the region. This information was not easily accessible through

secondary information channels. However, observation in context allowed us to realize local solutions.

The FGDs were also effective in assessing the quality of the information we previously gathered. Through the sessions, we realized that we had formed the needs, problems, customer segments, and value propositions appropriately, which we felt was a success. We got rid of our fears regarding the barriers of product usage scenarios. However, it made something more; it impacted the team's internalization of the problem by turning empowerment of the BoP into a personal challenge and developing a bond with Nigerian people and among the team members (Figure 40). I also felt the team's belief and support in me very strongly, especially towards the end of field research[32].

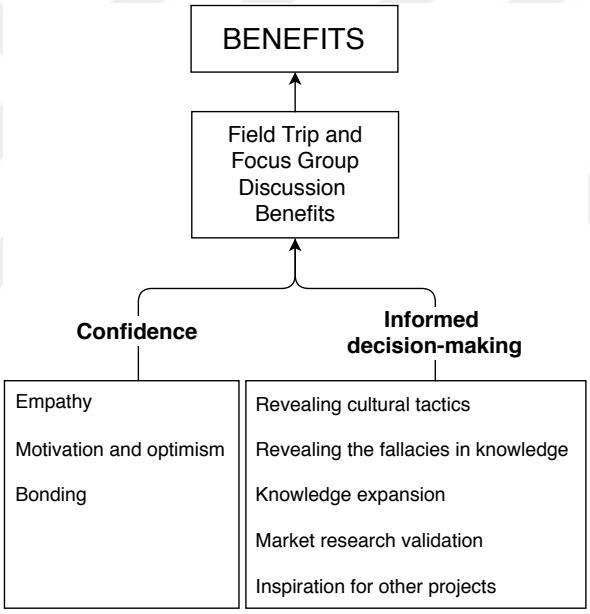

Figure 40. Benefits of the field research.

This section presented the challenges and opportunities of carrying out a field research. It revealed the mediator role of the designer forming an interface between the users, the product development team, and the members of the design agencies. The next section will demonstrate how the product development process

[32] I felt fortunate being on this field trip. The project leader explained to me that I was the very first Ph.D. student and one of the first employees in the entire organization who went on a field trip to Africa. Because most of the market research was conducted by means of global and local research agencies due to the conflicts in Africa.

took place after the user research, and what other roles emerged along with this process.

6.4. Design, Creative Facilitation, and Mediation (June-October, 2016)

Overall, the field trip and FGDs allowed us to be confident about our progress[33]. By this point, the key user insights were going to be taken into consideration, and the emphasis was going to be given on the research and development of the product's innovative working principle.

After the field trip and FGDs, I believed we needed to document the process we experienced until that date. Starting as something personal, I delivered a comprehensive user research report together with analysis, which shed light to our learning process by gathering all our insights together after the field trip[34]. Again, the project team expected only quick tips from the field as fast as possible. However, I wanted to make it useful in the long-term and asked for a week to prepare the report.

The report, gathering all our insights together, was adopted by the team with excitement. During a meeting on June 6, 2016, the project leader expressed that my analysis had better insights than the global research agency; my analysis was more practical, and it had informed outcomes that would influence decision-making. She said that I was like the research agency in this company, but an informed one knowing the strategies and the objectives of the company so that I could make meaning and influence decision-making more effectively. In this end, the report created a positive impact, and it was labeled as a department document.

Right after delivering the report, the project leader, design engineer, and I had a market insight workshop on June 10, 2016 to discuss our insights and see the overall picture to lead product design decisions. The workshop was aimed to

[33] This section is written by referring to the e-mails, memos in Journal 4, Materials 14-27, and Tasks T1-T2, T6-T12.

[34] The text formed the foundations of this Ph.D. research. However, labeling the document as the department document prevented me from publishing it.

reconsider the value proposition and settle on the design improvement goals. On that day, two major tasks of the upcoming stage were announced as functional and aesthetic design. Besides, although it was not announced that day, communication of the project progress formed the major body actions in the following stage. I was going to be involved in all tasks depending on the necessities or the gaps in knowledge.

I was working on the team's business-related tasks with the project leader, which started with the communication of the field research with internal stakeholders. For this purpose, the project leader asked me if I could help her with a PowerPoint presentation informing about the product working principle and simulation values, and I told her I could make a video[35]. For this purpose, I learned After Effects and made a video for explaining the working principle. The video (Figure 41) created excitement among the team members. It was also going to be an effective tool for informing the internal (global and local) stakeholders about the progress, alongside showing the thrill and motivation of the project team members.

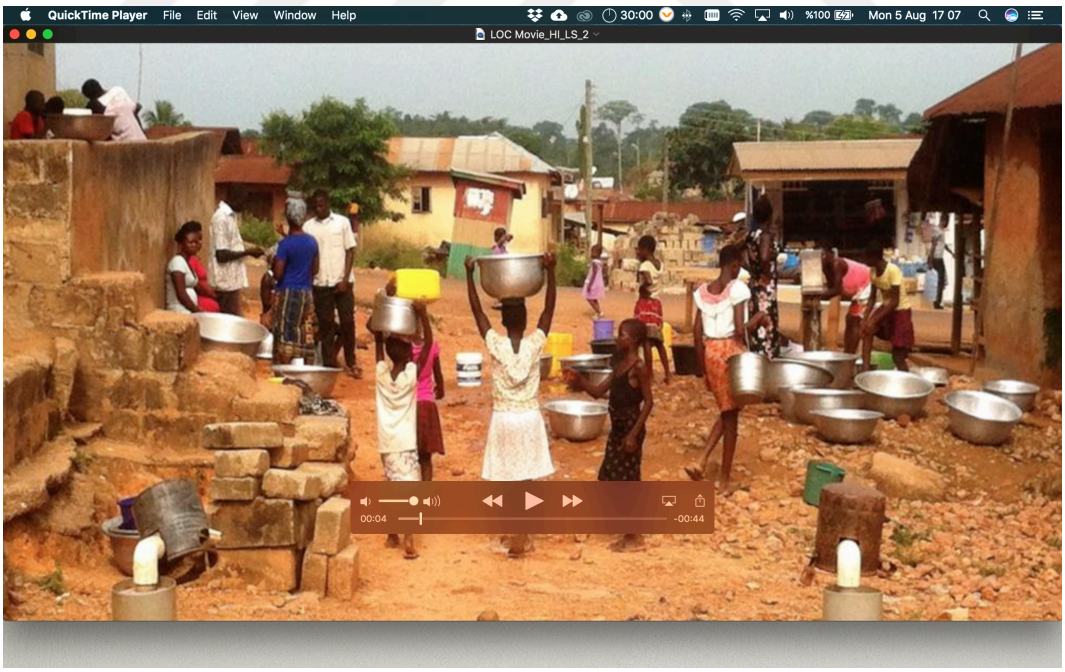

Figure 41. A screenshot from the video.

[35] The challenge was that my work computer was not equipped with the necessary software for video editing. I needed to use my own personal computer for creative tasks.

> "Magnificent! This video is just as I imagined! Only you could do it!" (G. D. A., personal communication. [Skype meeting], November 7, 2016)

> "[Proudly] I saw the CEO opening our video and watching it on his phone!" (G. D. A., personal communication, during a meeting in Istanbul by the end of 2016)

Having no previous experience of making a video in this scale, I was thrilled to receive such positive feedbacks[36]. This video formed the basis for the promotion of the project. In the upcoming stages, I received several demands from the project leader for the additions such as including the scenes from the field trip. I edited the video for special occasions such as management trainee kick-off meeting, university collaboration kick-off meeting, and Innovation Day, which was a notable event of the company. On this specific occasion, the project leader introduced me on the stage to all members of the company in Turkey as the user research expert of Case 1 and showed the video of our field research and development progress together with the product prototype we were working on during the project presentations.

Meanwhile, I also began to take the facilitator role in group discussions. Starting with the marketing insight workshop on June 10, 2016, when I found myself as a facilitator because I was able to visualize the discussions, my journey in creative facilitation began. After this incident, the project leader asked me to assist her with the management trainee project in Germany (Case 3) concerning trainees' familiarization with the needs and problems of the BoP. For this purpose, she asked me if I could help her with the design of a game for management trainee students, telling me I was a creative person and I could come up with good ideas for this kick-off meeting. I told her I had been reading articles about creative workshop facilitation, and I could design a game based on systematic techniques. I designed a game session, benefiting from flower association, guided fantasy, and

[36] In my opinion, the outcoming video was not to full professional proficiency, however, it was something the company was receiving consultancy for, because work computers were not equipped with the video editing tools and there were not many people who knew how to make aesthetic and persuasive videos. Considering I was paying attention even to the music at the background, choosing upbeat tones, and trying to make pleasant transitions between the images and videos with an accurate opacity, it was a skill the project team benefited from, for showing the motivation the team had for the BoP projects. Having the video-making capability increased the team's total skills to communicate the project with stakeholders and increase its impact.

H2 techniques (Tassoul, 2009, pp. 17-18, p. 104). The project leader facilitated the game session in Germany, and she shared her positive feedbacks regarding the success of the game session, and the positive atmosphere created thanks to it.

After this session, my contribution was asked explicitly for familiarizing the students with the how's of researching the African communities given the challenges of secondary research. For this purpose, on July 27, 2018, I shared the research framework I designed earlier and developed a research methodology to help the trainees make their research more systematically. I was available in most of the Skype meetings during which trainee students presented their research. My suggestions were taken for the assessment of their research validity and some further directions.

In the meantime, the project leader began sharing the global DT and UX training documents of the UX department in Germany, by which I observed that the UX and DT methodologies were embraced together in order to lead the product innovation processes in a human-centered and creative mode. These documents were proposing methods to guide the ideation workshops systematically. With this observation, I recognized that the tools developed by the UX teams were adopted by people who did not have expertise neither in the area of UX nor DT. Moreover, the tools were aimed at spreading contemporary mindsets among the entire organization. I interpreted these documents' significance regarding the confidence gained to proceed with a human-centered mindset. By explaining to the project leader that the methods offered by these documents were actually the methods used during the ideation phase of product design, I began to utilize the methods of the organization during creative workshops I designed in order to ease the communication of the objectives with the team members.

Other than these, together with the trainee project which runs on the global level, I was asked to assist the global innovation department's startup idea acquisition process (Case 8) with the research about the targeted region and resources. The outcoming information was used to assess the effectiveness of product innovation. My opinion was also taken for the perceived usability and human-centeredness, which I evaluated based on the criteria of Whitehead et al. (2014, 2016).

As it became more and more apparent through the process, although the working principle of the product was inspired from a basic traditional pot-in-pot evaporation technique, the design was a complex problem since the product had to optimize many objectives of company and brand strategies, working principle allowances, physical context, and user expectations all at once in a short period of time[37]. We began to talk about the utilization of the tools and methods such as TRIZ, which made it convenient to decide on which direction to follow.

In this process, the project leader and the design engineer concentrated on the technical aspects which required advanced physics and materials knowledge, and several laboratory tests for function and performance. In parallel, the academicians started working on product engineering. Although I barely worked with the design engineer and the academicians in this period, I designed the flow of a corporate workshop for technical ideation in which many internal (engineers) and external stakeholders (academicians) collaborated. Later on, I met the academicians with a Skype meeting and communicated with one of them during my laboratory visit in Çerkezköy, where I was able to express my suggestions for usability improvements.

Nevertheless, I was involved in the ideation process alongside the project leader. Following the first workshop on June 10, 2016, we carried out a second ideation meeting together with the project leader and her industrial designer colleague from the global team. The aim was to incorporate the field research findings to product design. In this meeting, I suggested nine aspects which needed improvement, and shared my opinions and sketches with them (Figure 42). The project leader was communicating these discussions to the design engineer because he was taking the initiative to decide on the incorporation of the suggestions or not as they might influence the product functionality and performance.

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[37] Later on, I came to realize that design thinking methodology would be utilized here the best, by revealing the dimensions of the product development, the challenges, tradeoffs, and aspects which needed prioritization to plan the roadmap of actions. We had to achieve many other objectives normally not visible, yet influential on the product development decisions. These objectives, other than the low-cost and off-grid criteria, could enter the design brief to reduce the complexity caused by invisible factors of the design process.

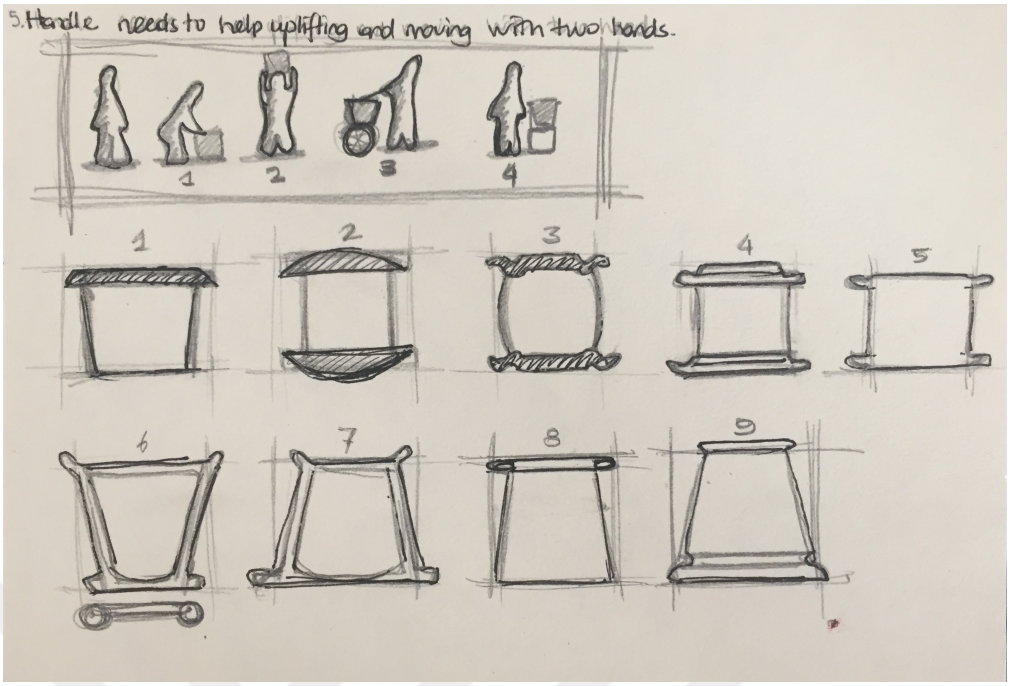

Figure 42. An example page from my sketchbook.

The project and its progress had been promoted very effectively, enabling the project team to be very influential, while increasing the expectations significantly from the team. However, the constraints of the working principle were causing stress among the team. The project leader had to deal with collaboration with academicians under strict confidentiality concerns. Nevertheless, the functional objectives were hard to reach without collaborations. The positive impacts of the field trip seemed to be perishing.

> I wish I were a designer; you are working on very enjoyable [creativity-led] aspects of design, not too constraining, technical engineering problems. (G. D. A., personal communication, August 26, 2016)

They saw me the luckiest due to my job, due to the skills and the work style. I was the optimist in the team, yet I was not able to relieve their stress due to distance. In this period, their request for me to be a full-time worker in Istanbul was voiced several times despite the fact that I was preferring to stay in Ankara, because I was fueled by my surrounding regarding the academic atmosphere and various

design projects, which were missing in the office environment at that time[38]. I believed these were the reasons that made me more creative and allowed me to look into things from a holistic perspective while keeping my credibility for being an influential team member. However, I was paying extra attention to be reachable all day, even after the work hours. My work hours were getting extended because every task was connected to each other, and any delay in any task was causing the project's schedule to extend.

In addition, I was visiting the office in Istanbul and Çerkezköy more frequently[39]. In times I was in Istanbul, I was suggesting little ideas based on simple physics, not that confidently, but by reminding that the problem could be solved with *back-to-basics* thinking[40]. In fact, I believed a completely different product design could be the solution to the problem and we were focusing on the details to improve function. I expressed the opinion that we could communicate with a design consultancy firm[41].

This was the time the competitor analysis gained significance again. The team members were discussing available engineering approaches and competitors to set objectives accurately. Through the review of the innovative products on the internet, I began to suspect the possibility of some products, which were intended for the BoP communities, being either suitable to be launched for other market segments such as higher socio-economic status across Europe, or to usage scenarios such as camping or picnic, probably for not losing all the investment made on research and development. These products were not able to solve problems such as electric dependency, and it was quite apparent that they were

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[38] I was working for the company through the incubation center of TOBB ETU in Ankara at that time.

[39] The project leader was requesting my attendance based on the event.

[40] At that time, I was not using this term to describe the necessary means of simplicity-led thinking; however, the term "back-to-basics" was voiced by the department manager several times later on, after the agile product development for mass manufacturing. Hence here, I go after him by adopting the term back-to-basics.

[41] I met the founder of the design consultancy firm during a jury I was invited at TOBB ETU in Ankara and learned that they had designed a product for an underdeveloped country with a multinational company. Although we aimed to collaborate, we could not work together as their proposal was not accepted.

designed with a mindset that could not go beyond the boundaries of the contemporary technologies such as the adoption of sensors.

On August 26, 2016, we had a voice meeting with a global NGO, which we contacted to continue the triangulation of the market segment and we asked of their position about carrying out a collaboration with a multinational company. In this meeting, I mediated the communication between the NGO and the project leader through the translation of the NGO's objectives and suggesting the middle way of actions to formulate the type of collaboration strategy. Starting with this incident and continuing onwards, my contribution to the mediation of the collaborations became increasingly prominent especially during the university collaborations.

From August to January in the following year, due to the technical affordances of the product, almost everything we went through until that date, ranging from market estimation and customer segmentation, was iteratively recalculated and checked. However, it was creating a tension between the members of the team because the reasons for these iterations were not clearly communicated, and some of the iterations meant that the outcomes were not utilized. This was also the time the communication between the team members decreased, although the situation required to work collaboratively.

Nevertheless, the university collaborations starting by September with industrial design departments for scouting and ideation purposes were going to be the source of motivation again. Although this time, confidentiality and intellectual property rights (IPR) agreement appeared as a challenge to resolve with the universities, it did not prevent the positive atmosphere that came along. The collaborations were aimed to be carried out with academic partners having a long-standing background of industry-university collaborations (i.e., industrial design departments of Istanbul Technical University and Middle East Technical University). Several meetings took place in the planning step in order to set the expectations from the projects appropriately. This step had crucial importance in transparent communication of the project objectives, and the resources regarding the duration, labor, confidentiality, IPR, student mentoring capacity of the

industrial partner and sharable technical knowledge. Meanwhile, we suggested a number of project themes to the academic partners. The academic partners decided on the project profile considering the academic objectives and characteristics of the project. As the objectives of each studio (e.g., junior, senior studios) differed in terms of gaining students a set of skills, the match between these skills and the project objectives were emphasized by academic partners. The difficulty of the project theme was another consideration in formulating the project profile.

I was going to take part in collaborations increasingly with the mediation role. I was a member of both communities, an employee of the company and an industrial design Ph.D. student at Middle East Technical University. I was available in most of the meetings as an interface between the company and the university. Alongside the project leader, who was voicing the aspects regarding the project management and IPR issues, I was explaining the objectives of the organization by referring to the academic literature (i.e., Papanek and Prahalad) and design terms to make it clear and communicable. I was also trying to understand the expectations of the academic partners so that the university collaborations could be achieved effectively. Upon the request of the universities, I began to write the project briefs [42] for the collaborations and prepare the presentations to show during the kick-off meetings. In writing these briefs, we needed to decide on the project themes by communicating their potential outcomes and their relevance to projects being run in parallel by the global team or other departments in the company.

During the planning of the collaborations, the academic partners raised their concerns regarding the lack of direct contact with the user group, which might impact students' research and empathy processes. In order to fill the knowledge gap in some respects, we planned to share some of the knowledge about African communities. As a first step, the project leader and I decided to carry out a

[42] While writing the university collaboration briefs, I realized that the Case 1 might have benefited from a brief containing not only the contextual requirements such as low-cost and off-grid characteristics but also the objectives of the stakeholders. Observing the goals of the project were dynamic, the brief might be kept up-to-date and visited frequently to assess the progress.

workshop with African employees with the aim of taking expert opinions to guide the university collaborations, especially for Case 5[43]. I designed a focus group session to be carried out with African experts and the project leader facilitated the session in Çerkezköy plant[44]. After the session, the project leader and I evaluated the insights and shared the corresponding ones with university students. Our communication with the experts started then and continued throughout the university collaborations.

At the end of six months, the phases and the objectives in each process became more evident (Figure 43; See Chapter 7 the description of the NPD phases). Through this course, *user-centeredness* and *UX* turned into influential terms. The project leader often mentioned *user-centered thinking* as a very refreshing and novel approach for product development, and that she was learning a lot by working with a *UX researcher*. She frequently told that she was voicing the positive impact that the *user-centered approach* had in the project progress in every social encounter with powerful decision-makers. By applying the human-centered approach for food preservation case (Case 1), the project leader also gained the *design thinking expert* title (the person who uses design thinking methodology built on user-centric approach). Subsequently, the number of side projects, taking our expert opinion for user-centeredness was increasing day by day. The project leader and I were being asked to design and facilitate *design thinking workshops* grounded on *user-centered approach* and *UX methodologies*. I was going to be very surprised to see the impact of the *UX-driven product development team* over the decisions of the organization, such as having a UX lab in Turkey and acquiring African workers in a short period.

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[43] The project leader had recently participated in design thinking seminars in Germany, keeping me updated about the design thinking approach of the company and sharing some resources. I told her we could plan workshops benefiting from these methods and carry out workshops during the two university collaboration projects. The decision of collaboration with African workers appeared at that point.

[44] I connected to the session from Skype, observed, took notes, and intervened in the session if necessary. Indeed, following a session from Skype was quite challenging due to remote connection; nevertheless, the session helped us to make meaning of our insights obtained from user research.

Also, in line with this, I felt my influence was increasing in the decision-making process for Case 1 and in the evaluation of other cases as a *user-centered thinker*. For example, after declaring my opinion to the project leader that it would be effective to conduct an ethnographic field study in Africa, a few weeks later, I learned that we would go to Africa and do a field study there in two-three months period. Similarly, I told the project leader how effective it would be to have a user research lab for the tests in Turkey, and a few months later a user research lab was opening, and my opinion was asked for how a user research lab design should be. I was overwhelmed when I learned that the company was going to acquire African workers and we were able to take their expert opinion, only a few weeks after I had mentioned ideally that we should interview African people or experts to validate our secondary research findings of African people's needs and problems. I was feeling very powerful to observe the influence I had over the decision-making and actions.

With the observation of six months, designing for the BoP communities was a complex process depending on heavy knowledge generation and learning (Figure 43). It required collaboration with other actors. The iterations and resolution of conflicts were essential. Meanwhile, I took different roles ranging from the *user researcher* to *frame creator*, *creative workshop planner and facilitator, evaluator*, and *inspirer*. Moreover, these roles began to pass onto the team members.

This section illustrated the process of product development with designer's skills upfront. It introduced the artefacts of the human-centered designer (sketches, videos, creative sessions), and presented the challenges experienced. The next section will reveal how university collaborations took place in parallel to the product development process in order to facilitate scouting and ideation about the BoP domain.

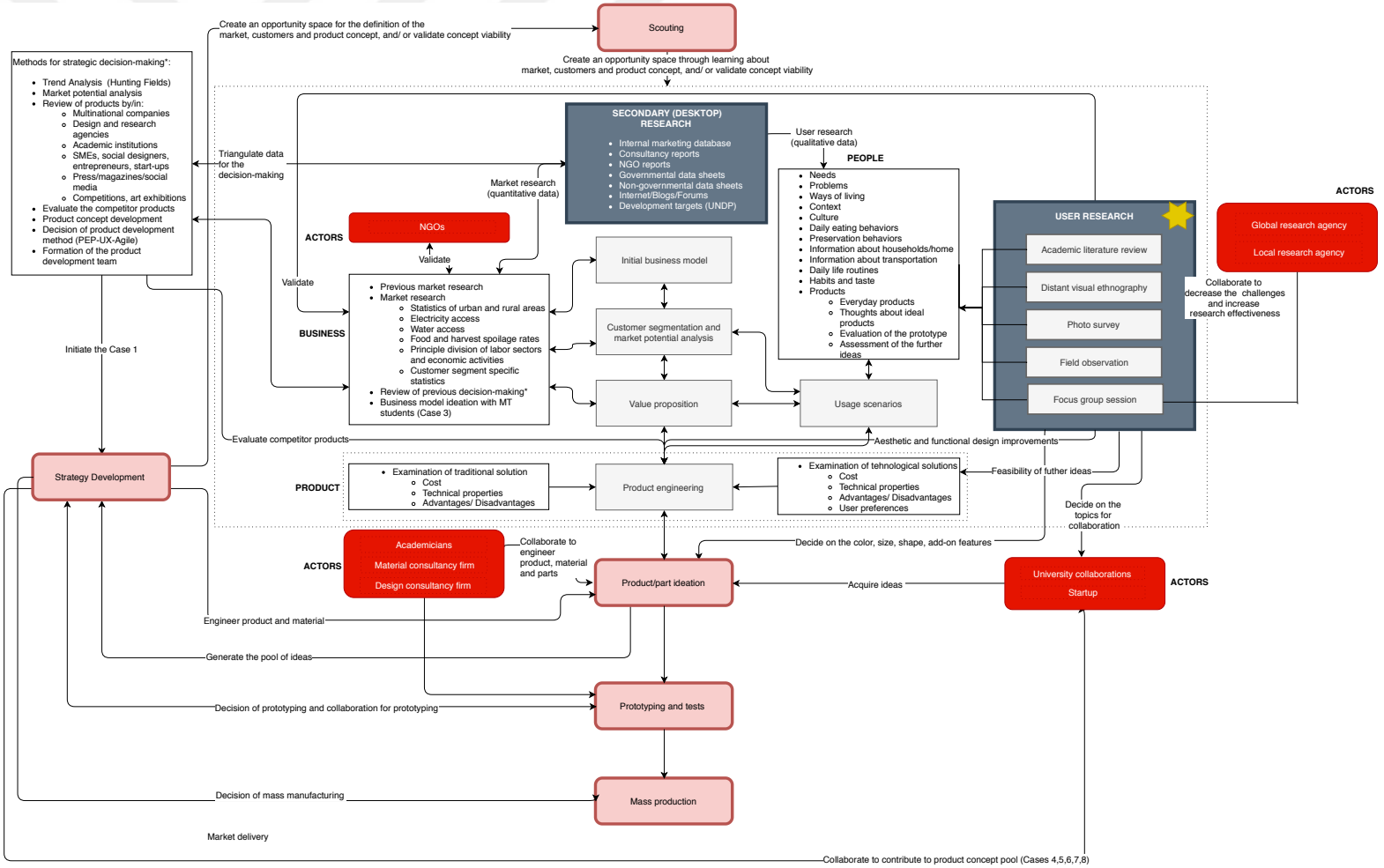

Figure 43. Cognitive map 4: The topics immersed within the six months and their influence onto the knowledge accumulation.

6.5. Learning University Collaborations (September 2016-January 2017)

The access to information about the BoP communities was a challenge given that students' only tool for data collection was secondary research and not observation[45]. Furthermore, the quality and accuracy of the information gained from secondary research were questionable. To overcome this, the project leader and I aimed to support students with non-confidential information obtained through various research channels. In both university collaborations running simultaneously (Cases 4 and 5), we made a presentation on the first day to sensitize students about the problem domain [46]. We shared our holistic understanding obtained through field observation, expert opinions, and research (Table 17).

Table 17. The components of the holistic knowledge.

Research Type	**Information Type**
Field Observation	The insights of employees who have visited Africa
Expert Opinions	The insights by African employees
Market Research	Key non-confidential insights from the market research
Academic Research	Scientific knowledge about people, needs and behaviors
Secondary Research	The information obtained from secondary resources such as google search, blogs, and video channels

The project leader and I participated in the preliminary juries in both universities. We observed that most of the students' user research was followed by the review of do-it-yourself solutions and start-up products targeting Africa. This was limiting students' ways of thinking into a narrower solution space. Besides, students' cultural differences were observed to influence their approach in concept

[45] This section is written by referring to the e-mails, memos in the Journal 4, Materials 28-30, and the Task T7.

[46] The project leader connected to the kick-off meeting at METU through Skype and informed students about the company. Respectively, I made the presentation to sensitize students with African communities based on our knowledge. I paid attention to make the presentation visually appealing with catchy phrases and visuals that convey the right and responsible messages.

development. This caused a barrier in products' fit into the BoP context. In order to overcome cultural differences, we planned a co-design workshop.

African employees carried out a half-a-day workshop to mentor students about human-centered approaches and product concepts' perceived usability at METU (Case 5). At ITU, instead of a workshop, we organized a question and answer session in which students could ask questions to African employees, the project leader and me (Case 4). The involvement of the African experts in students' critique sessions was observed to create a positive impact about building empathy with the African context. Besides, it gave a chance to convey the message about our objectives more effectively.

Afterwards, a group of employees including the project leader, me, engineers from other departments and African experts assessed student ideas for acquisition potential. Student projects were assessed by the industrial partner's stakeholders, mainly engineers, regarding projects' acquisition potential. I sensitized the assessors with industrial design approaches, student presentations, and different levels of detail and concept quality across the cases.

For the concept assessment, I reviewed academic studies pointing at the product development considerations for the BoP context (Van Boeijen et al., 2013, p. 37; Castillo et al., 2014; Whitehead et al., 2014). However, the considerations were not appropriately utilized due to the industrial partner's prioritization differences.

Assessment continued through the preliminary juries and afterwards. The emphasis was on the technical feasibility, and the overall assessment approach was grounded on expert opinions primarily for the concepts':

- technical feasibility,
- innovativeness,
- perceived human-centeredness and usability,
- context fit,
- aesthetical appeal and novelty,
- projected manufacturing costs, and
- projected product price.

The challenges that emerged during the experts' assessments were observed as:

- Projects being grounded on the principles in which feasibility assessment may require long-term research and development projects (Case 4).
- Concepts not necessarily being human-centered, however, having usability as the main concern with improved parts or additions, which contradicts with the low-cost strategy of the company (Cases 4 and 5).
- Limited diversity among student projects due to constraints in the off-grid working principle (Case 5).

In both cases, the project's confidentiality was a significant concern during the collaborations; the decision of the acquisition had to be given before the final jury since the projects became public. Afterwards, the product concepts, which passed the strategic assessment of the company, would be acquired by the industrial partner with the purpose of incorporating them into the company's product development agenda for Africa. All product concepts needed either technical improvements or further research and development before preparing them for mass manufacturing. Hence, the products were going to be prototyped and assessed for their effectiveness.

In Case 5, the final jury took place with the participation of an international group of employees from Turkey, Germany and Singapore. An African expert, an industrial designer, a marketing representative, a washing machine department representative, the project leader and I participated in the final jury. The global audience enabled a positive atmosphere and strengthened the ties. Meanwhile, the collaboration with academic stakeholders created an overwhelming impression inside the organization, increasing our team's impact and influence.

This section showed the learning process of BoP collaborations through presentation of the industrial design student projects. It revealed the stakeholders of the collaborations, the objectives, challenges, opportunities, and the criteria of assessment in these projects. The next section will present the features of the usability research that came after the university collaborations.

6.6. Remote Usability Research (November 2016-June 2017)

After the university collaborations, the preparations for the usability study gained acceleration[47]. These were the most intense days which required the team to work multitasking, and in an agile manner; the tests and preparations for the field usability study were carried out simultaneously. The prototypes had been improved according to the simulations for performance and design considerations. In this duration, several master's and Ph.D. students, academicians, design agencies, and research and development consultancy firms in Turkey and Europe were involved in the engineering process so that the efficiency could be ensured. On the other hand, the functional constraints and low-cost strategy were limiting the product development decisions regarding the usability enhancing features.

Meanwhile, I was involved in the planning of usability research together with the project leader and the marketing department. There was a lot of decision-making needed for the usability study. Primarily, the project leader asked me to design a short brief to get offers from local research agencies and shared it with many agencies. The initial opinion was contacting a reliable local research agency and carrying out the usability research and analysis as the product development team to prevent any meaning loss and manage the project budget. However, later on, with the subtle change of strategy for the usability research, we contacted the marketing department and initiated arrangements for the study. After having offers from global research agencies with the assistance of the marketing department, and evaluating their offers, we chose a global research agency to work with. This time, along with the research brief, research questions, and methodology, I was also going to design a conceptual product evaluation form, prepare a product manual and make a video with educational purposes for the local research moderators, while mediating communication with the marketing department[48].

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[47] This section is written by referring to the e-mails, materials indexed from 31 to 37, and the tasks T1, T14, T15.

[48] As the expectations from me increased gradually over time on behalf of research effectiveness, I began to carry out the tasks, which were usually supplied externally. The research questions,

However, before that, we needed to settle on various aspects for research decision-making. Given the conflict between the prototype performance values, business network in Africa and research team safety, the decision of the research location was even a challenge. There was a terror potential in the areas, where the prototype could function the most efficiently. This could risk the safety of the research team, and the delivery of the prototypes due to the possibility of plundering. Additionally, these places were lacking the business network. To this end, we were repeatedly carrying out target country analysis, and market and customer segmentation, which was demotivating. Respectively, product development team members had variant opinions about the research location.

Considering these risks and given that the usability study was going to be an expensive long-term research comprising almost two months, the preparations and planning needed to be made to its minor detail. Therefore, communication between the marketing department, global research agency, and local research agency[49] increased. The meetings were mostly held through Skype, the members were connecting from different locations, and informing the product development team about how they proceeded (Figure 44). The stakeholders also needed to be aligned on the aspects such as the expectations, research brief, product characteristics, usage scenario, respondent profiles, product manual and moderator video.

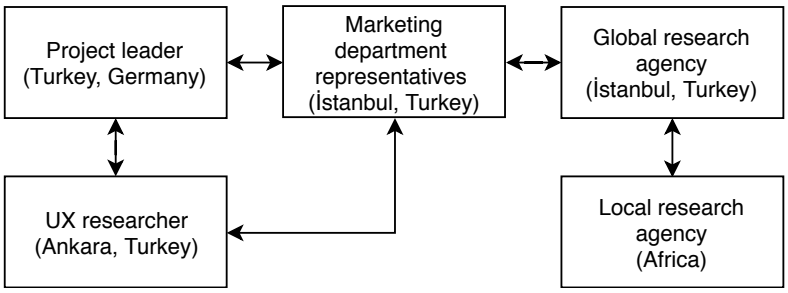

Figure 44. Communication between the stakeholders.

methodology, and research design were adopted as it was by the global research agency, blurring the boundaries of my tasks and responsibilities.

[49] The firm names and usability study location are not shared due to confidentiality.

Each step had to be decided upon together by considering the resources of the geography. On the other hand, communication with the local research agency members was a challenge on grounds of time zone differences, poor internet connection, and cultural aspects that negatively influenced the communication between the stakeholders.

I was working on the usability study brief by taking the support of the marketing department. In the design of the brief and research questions, I reviewed the notes I took till that moment, besides integrating the BoP and usability theories. The project leader made additions to the brief concerning the aspects for technical assessments of efficiency. After communication of the brief and research questions, assessment of the screener sheet (profile of the research participants) gained importance. The screening process had a crucial role in accessing the right people, therefore, it was a point we needed to communicate our expectations very well. Additionally, the necessity of the daily data collection from the participants became an issue each stakeholder agreed upon. Respectively, we included diary method to the research design, and I was involved in the visual improvements of the materials in terms of comprehensibility. Moreover, we agreed on receiving not only analysis but also video footages from the real context.

I needed to familiarize the project team with the aspects that would influence product usability. This was because the project team acquired an item to distribute together with the prototype during the field study, considering it was an insignificant decision. In one of my visits to the office, I explained the challenges there, and I persuaded the team not to deliver it along with the prototype as it might influence the perception of usability and comprehensibility. A few days later, we acquired a more usable item and worked on its comprehensibility considering the usage scenario.

Having doubts about the comprehensibility of the usage scenario, we decided to design a product manual for the research participants in Africa. For this purpose, I began with examining the examples of the manuals that the African experts provided. The manual had to be designed for all considering education level and be with graphical properties at the forefront. After receiving the statements from

the project leader, I designed a product manual for the usability study. The manual was revised several times based on the feedbacks of the global innovation team in Germany.

> This was the most beautiful thing that happened today! [After the manual was completed] (G. D. A., personal communication [Skype meeting], February 9, 2017)

Meanwhile, the project leader informed me that the product was going to be given a name and she asked my opinion for a product name among the pool of the names with an e-mail[50]. We added the name chosen to the product manual. The product was going to be launched with this name in the future as well.

As the field research was a golden opportunity to learn about any aspect which had been vague before, we discussed a number of issues to be included in the usability study procedure. After designing the manual, I began to design a concept evaluation form, which included all product concepts in our portfolio. This form was going to be used during the field research, for showing the concepts and asking people about their initial perception of the product concept using Repertory Grid Technique (RGT)[51]. The ones with potential were going to be included in the strategic product development agenda of the company. Twenty-five concepts from different product domains gathered in the product concept pool were added to this concept evaluation form. I designed the form as a notebook which involved the concept images and included pages to take notes about the impressions of people.

After the manual and the concept evaluation form, I edited the videos of the project leader, with which she aimed to train the local research agency moderators before the usability study. This video contained the instructions for the moderators, guiding their day one and interim meetings with the usability research participants.

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[50] Within a few weeks' time, the product was given the name I also voted for. The reason of voting for that name was due to the expression of a participant I heard in the FGDs. Moreover, the product was going to be launched in the market with this name in the future, which made me feel engaged, and proud of our human-centered progress.

[51] The method was not effectively utilized due to communication barriers of the local research team. Alternatively, the local research team and project leader probed the perceptions of the users with an unstructured interview.

Usability study was carried out in two countries. The project leader was at the field together with an African expert from the company and I was in Turkey, documenting and analyzing the field research momentarily through the photos provided from the field via Whatsapp and e-mails. The usability study was a challenge in one of the countries due to the local moderators' limited training, and imprecise profiling of research participants. However, the project leader acted quickly and took action to distribute the prototypes to the households we were targeting to reach. Despite the challenges, a few days later, the outcomes began to emerge, and they were promising.

> I wish you were also here […] It is very emotional to see that people are using the product and like it! [...] The women wanted to buy the prototype immediately. (G. D. A., personal communication [Whatsapp message], February 27, 2017; March 2, 2017)

After the usability research, I wrote a newsletter text to announce internally that the project was a success[52].

> Almost two-thirds of the world's population are expecting innovations that will make their lives better. Despite the challenges in accessing these forgotten population, it is our responsibility to address their needs.
>
> Empowering four billion people living at the "Bottom of the Pyramid" in all over the world requires radical innovations and reliable business models. Yet, we are aware that the development of the products and services has to be carried out with cultural sensitivity and environmental sustainability. Enhancing local capabilities and market knowledge with global practices without disrupting the cultures of local people is vital to deliver successful product and business model innovations.
>
> With our project [Project Name], we have seen that an innovative idea rooted in simple physics could create a profound change for the bottom of the pyramid! Our project has been trying to make a sustainable difference for Africa by focusing on the efforts on encouraging long term growth and increasing life quality (H. Işık-Tosun, text for the internal newsletter, May 30, 2017).

The promising results from the field ensured the product to pass onto the manufacturing process. Before that, it needed further prototyping for the quality

[52] I was encouraged to write the texts about the project progress regarding language skills and expressions from then and onwards.

standards and mass manufacturing, which meant the project was going to be passing on to another team.

This section disclosed the tactics in overcoming the challenges of the usability research, and the artifacts created (product manual, concept assessment form). It demonstrated the way usability research was promoted with internal stakeholders through media. The next section will describe the steps in project handover to the agile product development team.

6.7. Inspiration, Framework Creation, and Mediation of Collaborations (June 2017-August 2018)

I met the new product development team with a kick-off meeting held in Çerkezköy[53]. The department manager introduced us -the project leader, the master's student who contributed to the material innovation phase, and me- to this new team of product development, and made a presentation containing the insights transferred from our practices.

From this day onwards, the product development methodology for Case 1 was changing from user-centric to agile. The team size was expanding with people from various backgrounds, such as engineering, business, design, and supply chain, who would be working together simultaneously. And my role as an active team member was shifting to a consultant on a range of topics covering creative workshop design, framework design and university collaboration mediation for the BoP and the company's other strategic areas.

In parallel, the same product development team was starting on a second product development project with a different product domain (Case 2). On June 23, 2017, I met the agile product development team and observed their work style. The team was trained by an agile consultancy firm facilitator and they were applying the agile scrum methodology together. I was there upon the request of the department manager, observing the training and the facilitation techniques applied by the

[53] This section is written by referring to the memos in Journal 4, 8-15, Materials 38-49, and the tasks T7, T11, T16, T17.

facilitator of the agile consultancy firm, to gain familiarization with scrum methodology and formulate future opportunities for creative workshops. Meanwhile, I contributed to the sessions by sharing my experiences from the field research, to gain the team empathy with people, their needs, problems and ways of living in Africa. At the end of this day, we established warm relationships with the agile product development team members that continued in person for the support on human-centered aspects.

A few months later, an industrial design student joined the team in Istanbul. She was one of the students whose BoP product concept was acquired by the company during our university collaborations (Case 4). The department manager asked me to work together for training purposes with the student who was going to be working in the new product development case for the BoP (Case 2). The student was going to communicate the needs and expectations of the agile team with me, and I was going to guide her with the approaches and tools that the agile product development team could benefit from. Soon after, I began to mentor her about the BoP problem domain to help her embrace it, and which tools she could utilize. I provided the research framework I designed earlier to familiarize with the research domain [54], and guided her creative workshop design and facilitation process.

Alongside other projects[55], university collaborations for the BoP domain became a significant task I mediated in this period. I began to work with the department members for university collaborations. The aim was to build a system that would run effectively in the long-term; the collaborations were aimed to start once the project's objectives were communicated, the project profile was decided upon, and confidentiality and IPR procedures were resolved. In this respect, we initiated a university collaboration, being the graduation projects with two senior students at Middle East Technical University (Cases 6 and 7).

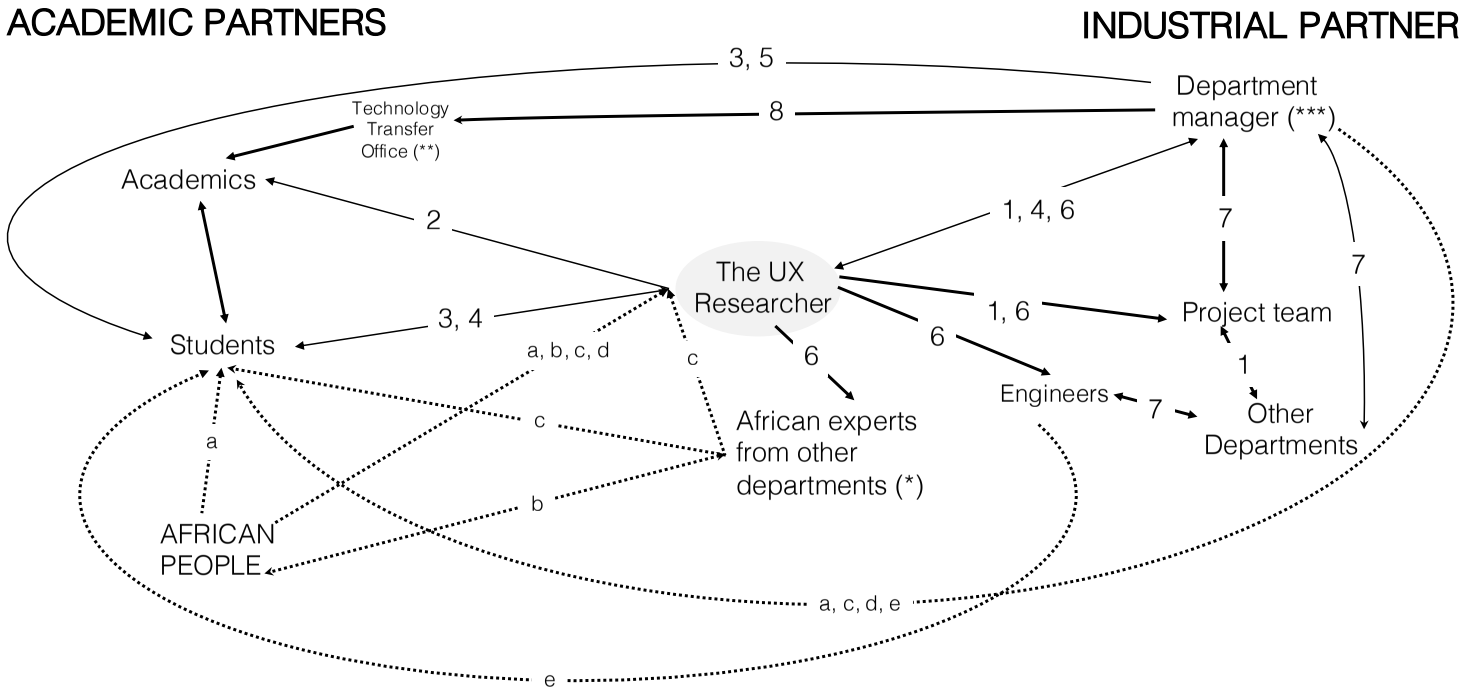
[54] This framework was rooted in the product development framework I designed earlier.

[55] Project on Industry 4.0.

Despite having been involved in a wide range of industry-university collaborations in the domains of engineering, the department members had carried out neither industrial design collaborations nor collaborations for low-income communities, before. Due to having a background in industrial engineering and specialization in industrial design, I was asked to mediate the communication between the industrial and academic partners (Figure 45).

Internally, I was in touch with the project team and the department manager who collaborated with other departments (Figure 46). My role was familiarizing the project team and other stakeholders with the industrial design collaborations by sharing my previous experiences. I was sensitizing the internal stakeholders with the approaches and terms of industrial design, and communicating the operational flow, the procedure, the phases and the expectations in each phase, for systematization (Figure 47). Other than these, I was taking part in the execution of the collaborations, which began with the project topic selection, review of the student portfolios, and student evaluation process, and continued with the communication with the academic stakeholders, student mentoring, and student idea assessment for usability considerations. Finally, I was informing the internal stakeholders about the deliverables, i.e., the level of concept detail to expect in each student presentation [56].

[56] Meanwhile, alongside the collaborations, I worked with my colleagues from Innovation and Technology Management department, connecting their video meetings, helping them with their projects such as development of the department's blog (E. G), impact projects of three M.Sc. students (P. D. A., E. U., H. T.), industry collaborations with engineering departments of Bilkent University (where I obtained my bachelor's degree) and partially METU (where I was a Ph.D. student) (with G. Ö., E. G., and E. Ö.), and application for grants for global research projects (with G. Ö. and A. B. A.). By working with other M.Sc. students, I almost felt like an academic advisor. One M.Sc. student told me "I enjoyed and learned a lot working with you" (E. U., January 2, 2018, personal communication [WhatsApp message]). This was quite a tense period where my weekly schedule was full of online meetings with coaching or facilitating ongoing projects of the rest of the department members. Moreover, it solidified the opinion of me having a different learning style was affective for transmitting to the members of the department. Nevertheless, I could not say that I was able to bond with all department members; only the colleagues that I worked together developed empathy towards my work style and expertise.



a. Secondary research
b. Field observation
c. Expert opinion
d. Market research
e. Engineering considerations

* Cases 1 and 2
** Cases 3 and 4
*** Project leader in Cases 1 and 2

1. Defining project expectations through a series of meetings
2. Describing the academic partners' expectations from the project through a series of meetings and designing a project brief to inform the organization
3. Sensitizing students with the BoP concept, people's needs and problems on grounds of a, b, c, d.
4. Communicating students' questions, regarding research and technical feasibility, to the organization.
5. Mentoring students on technical aspects
6. Sensitizing about the outcomes by communicating the project's aim, goal and design considerations.
7. Assessing student project outcomes considering the organization's Africa strategies.
8. Negotiating the Intellectual Property Rights of the conceptual student ideas with acquisition potential.

Figure 45. Mediation of the collaborations.

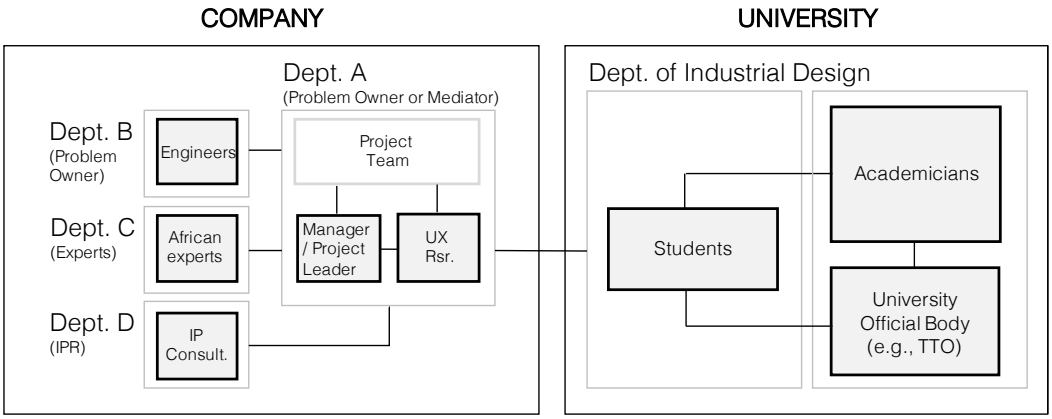


Figure 46. The stakeholders of the collaboration projects.

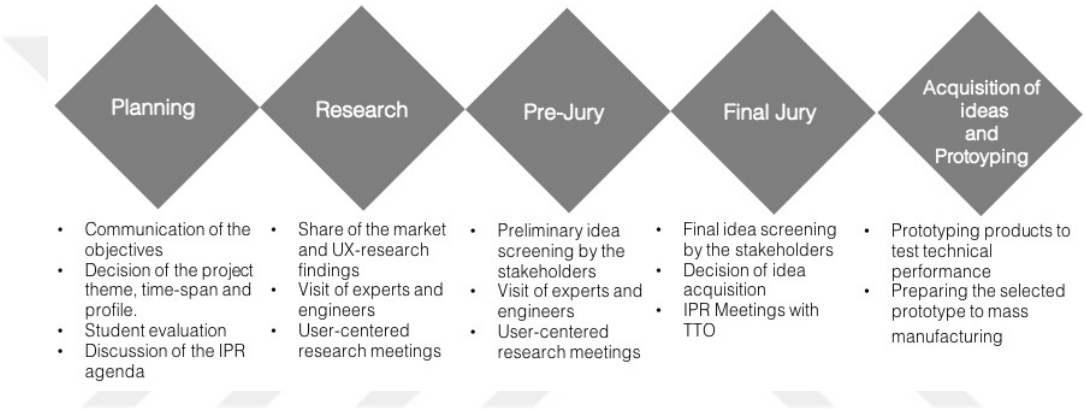


Figure 47. Flow of operations regarding the collaboration phases.

During the planning phase of the collaborations, I aimed to ensure common grounds for communication by taking part in the project formulation, design briefs (whether the objectives were clear) and meetings, in which the industrial and academic stakeholders were sensitized for each other's' expectations. By communicating with both stakeholders, I was able to observe the objectives and support them to formulate the middle way in our actions (Table 18). The communication of the objectives was believed to play a significant role in establishing a sustainable and long-term network between the company and universities to address the needs of low-income people in Africa. The department manager expressed that this was an aspect necessary to build the *value chain* in the BoP problem domain.

Table 18. Objectives of the stakeholders.

Stakeholders	Industrial Stakeholder	University	African BoP communities
Objectives of the Industrial Stakeholder	1.Increase revenue through market growth. 2.Increase innovation power.	1.Build a long-term research and development network with over-achiever universities in Turkey. 2.Acquire ideas and expand the idea pool. 3.Scout creative ways of thinking and doing.	1.Develop products that will address the needs of the BoP communities. 2.Increase African people's familiarity with the brand. 3.Create and sustain the business with Africa.
Objectives of the University	1.Carry out collaborations with a global company. 2.Empower students through commercialization of ideas. 3.Develop a long-term research agenda with the industrial partner, and publish academic research.	1.Gain students the designer skills by carrying out a studio project about a valid design topic. 2.Increase the number of patents and utility models. 3.Enable students to participate in design competitions and awards.	Contribute to the solution of the global and social problems.
Needs of the African BoP communities	Buy affordable and durable products that perform well in the context of Africa.	-	Increase their families' life quality.

During collaborations (Cases 6 and 7), besides communicating with the academic stakeholders, who did the planning for the collaborations, I mentored the students, throughout the semester by weekly meetings, to gain them empathy with African people and improve product concept usability[57]. And, the department manager supported students on the aspects regarding technical design and product engineering. When further assistance was needed, students were invited to the factory to consult the engineers and experts.

[57] I met the students once a week for one hour. These meetings were very effective to gain students the motivation to address the BoP problem domain considering the challenges of research and lacking the observation opportunity. In addition to this, warm relationships were established with students.

The assessments of the projects began with the preliminary juries, in which engineers from the organization came to Middle East Technical University and assessed student ideas regarding the acquisition potential. Aiming to incorporate human-centered assessment of the product concepts, I reviewed the literature and utilized the study of Whitehead et al. (2016), which presents the indicators of products designed for developing countries as affinity, desirability, reparability, durability, functionality, affordability, usability, and sustainability.

The document was introduced to internal stakeholders to assess conceptual product ideas in university collaborations on a Likert-scale from 1 to 5. This assessment document attracted the attention of the product development team and it was shared with the stakeholders of the project. On the other hand, the team had difficulty in internalizing the indicators due to their subjective characteristics.

Besides, the indicators did not fully facilitate the assessment of conceptual product ideas. Several reasons can be counted in this:

1. The indicators were built on the assessment of products in use, whereas the products assessed via the evaluation tool were conceptual. Besides, third year and fourth year studio projects provided conceptual ideas with different qualities such as visualization of technical details. This formed a gap for the assessment of indicators such as reparability and durability.
2. The team assessed conceptual ideas mostly by their perceived visual qualities. The conceptual products needed to be prototyped in order to see if the indicators could be addressed or not, which was not possible.
3. Different interests of stakeholders, whose expertise were grounded on engineering and who were not familiar with conceptual product ideas of varying maturity, were a challenge in the assessment of conceptual product ideas.

The team replaced the dimensions with technical considerations and the opinions of experts based on technical criteria. During the assessments, which began then and continued until the final jury, the emphasis was on the technical feasibility, and the overall assessment approach was grounded on expert opinions primarily for the concepts':

- technical feasibility,
- patentability,
- innovativeness,
- manufacturability,
- durability,
- efficiency,
- perceived human-centeredness and usability,
- context fit, and
- aesthetical appeal and novelty.

The patentability became a major concern in the assessment of the internal stakeholders. Because, although the product concepts were proposing value for people in Africa, they would not be utilized if the concepts were not patentable. With this regard, the settlement on the IPR gained importance through the collaborations.

Once the collaborations were achieved, with the observation of the previous four collaborations for the BoP problem domain, I developed a model built on my experience from the previous cases, describing the stakeholders, tasks, objectives, and relationships among them to lead the future initiatives of the project team. Following this, I wrote a newsletter text to promote the collaborations internally and externally on LinkedIn pages, bringing the impact and attention towards the BoP collaboration projects.

On accounts of better communication, there were several advantages of establishing the network between the industry and the university with the mediation of a person who belonged to both institutions. However, one should also note the challenges; the pressure due to the absence of the boundaries between the roles. Mediating the communication for the company as an employee, and with the university as a Ph.D. student, had to be managed delicately, wearing the hats of both parties. Keeping a positive attitude, being attentive and solution-oriented were key to establishing relationships despite the challenges of the BoP problem domain.

This section provided insights about the steps of the project handover (Case 1), and along with the handover, the shift in the role of the human-centered designer; in the form of an internal strategic consultant and inspirer for the dissemination of the human-centered approach across the organization.

6.8. Conclusions to Chapter 6

This chapter presented the findings of the autoethnographic inquiry by describing my long-term experience of the BoP product development as a member of the product development team of the multinational company. It showed the roles across multiple cases (Cases 1-8), benefiting from designerly ways of thinking and doing, and with respect to the challenges and opportunities faced throughout the product development process. The respective two chapters will analyze the new product development process, and the roles that the designer took, in order to answer the research questions separately and in an in-depth way.

CHAPTER 7

ANALYSIS OF THE NPD PROCESS

This chapter analyzes the findings concerning the BoP product development process of the multinational company. In this respect, the first section demonstrates the characteristics of the observed product development phases. Then, the following two sections depict the characteristics of product development by discussing how phases, methods and tools adapt to answer the demands of the BoP context. The chapter concludes by showcasing the observed NPD process, and discusses the relevance of the phases to the design thinking approach.

7.1. Phases

The significance of the models followed in the new product development process was presented in Chapter 3. The literature review showed that the ultimate aim of NPD processes is to sustain and grow the company in the long-term period (Goulding, 1983). The companies have their own NPD process models based on their strategic needs (Cooper, 1999) and their NPD models range from linear to flexible processes (Owens, 2009). Moreover, the demand to catch the patterns of today triggers the transformation of NPD models empowering the role of design thinking at an organizational level in order to adapt and evolve (See Section 3.2 in Chapter 3).

Supported by the literature review, the new product development process of the company was an evolving process that started as a process rooted in the conventional NPD tradition of the company and transformed along with the *UX-driven development*[58] accompanied with the *Design Thinking* (DT) approach, and

[58] On a LinkedIn post, Chief Executive Officer, Karsten Ottenberg, refers to the human-centered development process as UX-driven development. Therefore, I utilize the UX-driven development terminology to refer to the process I was involved in as a human-centered design practitioner.

Agile Scrum methodology (See Section 7.3.4. for further discussions). As autoethnographic inquiry revealed in the previous chapter, the product development team initially formed the NPD process with the tasks including (i) ideation (concept engineering), (ii) market research, (iii) prototyping, and (iv) mass manufacturing; there was already a product concept with engineering concerns decreased. After immersion, I observed that the flow of operations was associated with Product Emergence Methodology (PEP) tradition of the company, which prioritizes the feasibility of a product concept.

Nevertheless, the incorporation of UX-driven development influenced the flow of operations, by empowering a process with five flexible and iterative phases including (i) strategy development, (ii) scouting, (iii) ideation, (iv) prototyping and (v) production (Figure 48). The following sub-sections explain the phases with respect to their qualities.

Figure 48. Phases in product development.

7.1.1. Phase 1. Strategy Development

Strategy development took place throughout the product development process with the decision-makers from the global and local company and the project leader involved. As the product development team, consisting of the project leader, UX researcher, and design engineer, we discussed the strategies and whether the project progress was in line with the company's strategies or not (See Tasks T0-T4 in Table 23).

There were two major concerns in strategy development: long-term implications and assessments of feasibility in achieving strategic targets. Long-term strategies were driven by the necessity to find a gap in a product development area that would increase the company's competitive advantage and help the company to sustain in the long-term. They were determined based on the collection and evaluation of the signals pointing at the directions for product development. The trend analysis method was helpful in formulating the future directions for new product development. For instance, the reports pointed at the benefits of entering markets such as BoP.

Whereas, the feasibility assessments happened iteratively throughout the project with respect to the capacity to achieve the strategic targets. The project progress, time plan, resource allocation, inclusion of internal/external stakeholders, incorporation of stakeholders' ideas to product development, decision of product development methodology, and mass manufacturing approval were the significant decisions throughout the process. The project continued as it passed the feasibility related considerations of global decision-makers, showing that the classical stage-gate models with go/no decisions were still effective (Owens, 2009). Strategy development was accompanied by the scouting phase, described in the following section.

7.1.2. Phase 2. Scouting

Being rather a market-oriented approach, scouting took place primarily to validate the viability of the hunting/opportunity field (such as cooking, food preservation, etc.) and the product concept for the specified society. In this phase, the product development team:

- Carried out research about the hunting fields that had been set during strategy-making through the trend or products analysis,
- Determined customer segments associated with opportunity fields via market research,
- Prepared value propositions by combining the insights on the needs,

problems, and physical context of the customer segments, and

- Analyzed these segments based on the prevalence of these needs and problems via market potential analysis.

Scouting generated insights about the regions, countries, and customer segments and inspired the team for other project topics for business making (See Tasks T1-T4 in Table 23). Nevertheless, market related approach contained challenges for sensitizing with the BoP communities, hence, it was accompanied with user research. It was an iterative process that continued throughout the development, and informed the Ideation phase, which will be explained in the following section.

7.1.3. Phase 3. Ideation

During ideation, the pool of ideas in the form of sketches and 3D models was generated through various internal and external channels, individually or collectively (See Tasks T7, T9 in Table 23). Internally, the participants of ideation were the product development team, corporate experts with engineering and design backgrounds, and interns or graduate students (i.e., Ph.D. and M.Sc. students). External channels of ideation included but were not limited to:

- **Universities in Turkey:** Student projects allowed to embrace the problem area with creative and innovative approaches. However, for most of the time, the outcomes needed to be revised based on technical feasibility and material selections.
- **Startups across the world:** Startups were supported if their products were technically feasible and easy to manufacture. The level of market readiness of a product concept determined its feasibility and hence the acquisition potential. Having a working prototype, an established supply chain network, and the indicators of sales increased the potential of acquisition.
- **Professional designers/design agencies in Turkey:** Consultancy taken from professional designers and agencies was also an option when there was a need to improve the design concept in terms of technique and

form with design expertise.

Ideation was accompanied with prototyping, which will be described in the following section.

7.1.4. Phase 4. Prototyping

Prototyping took place for the elimination of product concepts performing below the strategic and technical considerations. The team delivered prototypes and improved them iteratively through a series of lab tests for performance considerations. Decisions about shape, material, and function were made according to engineering standards, experiments, and simulations. Advantages and disadvantages of each prototype were evaluated, and the prototypes that addressed business strategies, manufacturing considerations, and user-issues and contextual concerns (See Task T9 in Table 23) were selected for further development. Prototyping was ultimately aimed at manufacturing, which will be explained in the following section.

7.1.5. Phase 5. Production

After the evaluation of prototypes, the selected prototype was improved for manufacturability. Meanwhile, criteria such as ease of assembly and properness of material for forming and molding operations in mass production were critical for the design engineering decisions. In parallel to manufacturing, distribution channels and possible partnerships for the supply chain were set before the market entry. Logistics, supply chain, business model, packaging, target country's national politics, law, and regulations were some of the topics that needed to be resolved during this phase. This phase was the most informed process that proceeded using the know-how of the company.

This section introduced the phases of the new product development process. Although the NPD methodology transformed upon UX-driven development, the content of the phases was shaped at a strategic level concerning the resources and considerations of the company. Nevertheless, the contribution of human-centered

approaches was apparent during the adaptation of the NPD phases to designing for the African BoP communities. The following section explains the characteristics of this adaptive process based on the opportunities and challenges experienced.

7.2. The Adaptation of NPD Phases to Designing for African BoP Communities

This section presents how the product development process is adapted to designing for the BoP communities. For this purpose, it respectively examines the phases, and methods and tools of the product development process.

7.2.1. Phase 1. Strategy Development

BSH Home Appliances has already been offering products for Africa's medium and high-income communities with European taste in home appliances (See Bosch in Africa, 2018). However, the company did not have any product development effort for African BoP communities until this case.

The foundation of the project was primarily rooted in the reports, which signal a significant market growth for Africa in the coming years, with perceived long-term benefits. Nevertheless, at that time, the essential know-how to enter the BoP market did not exist. Therefore, achieving a successful a product addressing the needs of the BoP communities would be key to enter a new market with a growing population.

For this case, the observed product development process was initiated with the support of the company's corporate responsibility channels for creating a disruptive technology for African BoP communities (G. D. A., personal communication, February 8, 2016). The trend reports pointed at the needs of African BoP communities to be different from any consumer groups on grounds of water and electricity access. By considering contextual feasibility, the company announced the objective of the project as improving quality of life at the bottom

of the pyramid communities in Africa by offering them low-cost off-grid products (BSH Home Appliances Group, 2018a, 2018b; Torun, 2018). In this respect, the company aimed to create an impact on the BoP communities with a for-profit initiative (See *corporate pure play experiments* on p. 59, para. 2).

Moreover, a long-term strategy of entering the BoP market was recognized as the creation of brand awareness and positive reputation among African communities (BSH Home Appliances Group, 2018a). In a video by BSH Home Appliances (2018), Chief Operating Officer Michael Schöllhorn also describes other targets of the project as "[to] make people aware of the brand Bosch and create positive attitude towards this brand". Therefore, the brand recognition across the region needed to be in line with the company's positive characteristics such as customer-centeredness and outstanding technology and quality (BSH Hausgeräte GmbH, 2018c).

Nevertheless, the risks associated with unfamiliarity with BoP communities and their context was a barrier in the product development process; infrastructure problems, resource scarcity and financial uncertainty of BoP communities were some of the aspects making the product development challenging to foresee the results. As regards to this, the product development process was treated as a complex problem, and there was the search for alternative methods to manage complexity (See Section 7.3.4).

The concerns also led to the acquisition of the employees who could benefit the product development process with relevant skills. After I joined the team as a T-shaped employee and a UX researcher, we were able to approach the process with human-centered design approach and design thinking methodology. Moreover, the topics regarding user-centeredness, usability, product simplicity, ease of use, and durability, began to be discussed throughout the meetings.

Right at this point, another opportunity emerged through the integration of the human-centered design approach. The project undertook the mission to contribute to the long-term innovation skills of the company to compete sustainably in the long-term by familiarizing with UX and DT (See Tasks T16-T17 in Table 23). This was a learning process in which the product development team applied an

alternative product development method and carried out collaborations with external stakeholders to create the knowledge for BoP product development. And it was intended to continue with the development of other innovative products.

Also in line with this, the project was an opportunity to empower employees by equipping them with innovation skills through the application of contemporary methods and tools. Moreover, another opportunity was raising around the engagement of the employees with the company and the design problem; BoP product development was increasing the spiritual wellbeing of the product development team, through the facilitation of feeling part of something bigger, and a *real* problem. In one of the meetings with the Agile team (M.S.) expressed "I feel like I am doing good for the world".

Furthermore, the company was aiming to create a value chain through the integration of stakeholders to its product development process (Cases 4-8). Hence, the product development team was in search of internal and external partners of collaborations. The collaborations were aimed to support the scouting and ideation phases, which will be described in the following sections.

Overall, while entering the BoP market and creating positive brand recognition were the prior strategic objectives of the company, other opportunities including the empowerment of employees for innovation with contemporary design methods (i.e., HCD, DT), employee engagement (i.e., by feeling part of a responsible goal), and formation of the long-term value chain (i.e., collaboration with stakeholders to last in the long-term), emerged along with the practice. All of these findings are in line with the proposition of Del Baldo (2013) (See Section 4.1.5. p. 67, para. 1). I was able to observe these objectives by taking part in the strategy development.

7.2.2. Phase 2. Scouting

Scouting did not necessarily take place after strategy development; it was experienced as an iterative process, which continued throughout product development in order to facilitate knowledge generation and decision making

about the BoP product development. Through scouting, the product development team:

- Informed business decision-makers iteratively with market potential analysis, and market segmentation for BoP,
- Defined the BoP customer segments,
- Developed value propositions for the BoP customer segments,
- Formed usage scenarios for the BoP customer segments,
- Validated the viability of the product concept, market segments, customer segments, value propositions, and usage scenarios in food preservation case (Case 1) through secondary research, field observation, and FGDs, and
- Formulated opportunity fields for further product development projects (Cases 2-8).

For Africa, at first, the method of scouting was secondary research, mostly aimed at obtaining quantitative data to reveal facts about the region in order to inform decision-makers. Besides this market-led research, I carried out secondary research to get familiar with the context and to find relevant problem areas to work on. The research revealed (i) quantitative data (facts and estimations), and (ii) qualitative information (reports for needs) (Table 19). It familiarized the design team with the context, showed prevalent patterns, and provided insights for contextual constraints. However, the access to accurate data about African BoP communities was a real challenge. Therefore, we needed other means to validate data, through expert opinions, collaborations, and alternative methods of research.

Table 19. Secondary research channels.

Type of research	Quantitative data in	Qualitative data in
Secondary research	• Internal marketing database • Consultancy reports • Governmental data sheets • Non-governmental data sheets • Internet / Blogs / Forums • Academic papers	• Development targets • Consultancy reports • NGO reports • Academic papers • Internet / Blogs / Forums • Conceptual products and products on the market • Review of university-industry collaboration booklets • Review of public design contest ideas • Examination of value propositions of the products on the market

Expert opinions formed the basis for the validation of the data collected in this phase. Although many experts were contacted, the channels of data collection and validation were mainly NGOs and African experts. Moreover;

- Governmental organizations were not readily available for collaborations. The governmental channels were hard to reach unless there was an official consent.
- NGOs were not always open to collaborating when they knew the project was for-profit.
- The company's acquisition of African workers was valuable because of their context familiarity. Native employers allowed to obtain first-hand information about people, needs, and the ways to reach them.
- Despite being of vital importance, the challenges in reaching people in distant geographies made it hard to take opinions of users on a frequent basis. It was perceived to be a time-consuming and an expensive task due to the necessity of planning to cope with risks associated with terror, travel, and health precautions. Therefore, the decision of user contact was made by evaluating the necessity, planning, budget, and security.

Furthermore, the flow of information from various channels without order was a challenge on behalf of systematic knowledge generation. This was the period the

framework creation gained crucial importance to communicate the aspects that seemed ambiguous (See Section 8.3.2. Frame Creator).

To overcome the challenges in the first place, we applied HCD and associated methodologies (See Task T5 in Table 23). These included distant visual ethnography: photo-search (i.e., Internet search), video search (i.e., Youtube, Vimeo), visual ethnography (i.e., Google Maps), photo survey (research at households and public spaces), field observation, and FGDs (See 8.3.1. User Researcher). Along with this, human-centeredness and design thinking methodology turned into strategic approaches. Although there were questions regarding their effectiveness for a grounded decision making for business, HCD was utilized to gain the team empathy with the BoP domain in a responsible way.

By initiating the HCD process and user research, the aspects such as getting familiar with the characteristics of unfamiliar people living in a distant geography, empathizing with their needs and problems, describing their environmental and infrastructural context, and revealing the products they use in their daily lives, gained significance other than seeing people as numbers. Respectively, field observation strengthened the familiarization process by gaining contextual and social sensitivity. It facilitated familiarization with daily life patterns for the BoP, the way people look, feel, and behave, what preferences and habits they have, and which environmental, infrastructural, political and social context they live in. It created awareness about people whom the product will be designed for. It was useful to build responsibility considerations, which could influence the design decisions and business model.

After familiarization with people and context through HCD, we reembraced the needs, problems and related opportunity fields to formulate value propositions for BoP customer segments. We also brainstormed with Business Model and Value Proposition Designer Toolkit, Customer Segment Canvas, and Empathy Map obtained from Business Model Inc (BMI, 2019).

Along with the food preservation case (Case 1), further ideation concepts and the set of requirements began to emerge through the analysis carried out in this stage, though they were not in the form of a brief. These topics were addressed through

ideation in/with other cases (Cases 2-8). The next section provides the characteristics of ideation.

7.2.3. Phase 3. Ideation

The ideation phase took place to generate the pool of innovative ideas, filling the gaps in the opportunity areas of the BoP domain. It aimed at having various creative and innovative appropriate/intermediate technology concepts (See Section 4.4., p. 83, para. 1) formed internally or externally. Therefore, collaborations with universities and startups were a significant part of this phase (Cases 4-8).

Throughout the food preservation and cooking cases (Cases 1 and 2), ideation was not limited to the design of product concept, form, or its parts. It involved the research and development of materials, techniques, and even business models. The research into engineering aspects such as physics, mechanics, and material science were dominant in taking design decisions. Ideation extended to business model development with management trainees (Case 3).

During product concept ideation, the principle of going back to basics, the search onto the forgotten practices, traditions, and techniques were appraised when coming up with innovative ideas for the BoP context. The concepts' viability was examined by comparing them with traditional practices, methods, and products on the market based on cost and efficiency-related concerns.

As a result, facilitation of creativity became necessary to lead out-of-the-box thinking. The team and internal and external stakeholders were supported for human-centered, creative, and systematic tools (See Section 8.3.4). Moreover, mediation of the collaborations with external stakeholders gained crucial importance. Through mediation, the company valued having socially embedded relationships with collaborated organizations (See Section 8.3.3).

Meanwhile, patentability, confidentiality, and IPR gained significance regarding the mass production objective of the company, while causing a challenge in the management of the collaborations. Six concepts from university collaborations

were acquired on a range of BoP opportunity fields and prototyped to test their technical feasibility (Cases 4-7). The next section explains the prototyping phase.

7.2.4. Phase 4. Prototyping

Prototyping came along with the ideation that happened through various channels. Internally, during the food preservation case (Case 1) the product development team aimed to test product usability, -effectiveness, efficiency, and appeal- by prototyping the product and its parts (See Task T14-T15 in Table 23). During UX-driven product development, the team prototyped concepts in order to find a convenient product form that could run effectively in the physical context of the BoP communities.

At that time, the simulation of the real context gained crucial importance to ease prototyping, as it was not possible to conduct field research continuously due to the financial and time-related considerations. It required extensive planning and bureaucratic procedures to overcome. As a solution, mimicking the African context in the factory labs seemed like an appropriate decision; however, it had its own challenges, because there was a number of variables that could potentially affect product functionality. This included variant humidity, heat, weather, placement, position, dust, animals, and insects/pests. For simulating an ideal environment, the team found the outcomes of the desktop research and user study to be critical, in order to define these variables and test the prototype.

Prototyping continued as an iterative process, in which the prototypes were produced both internally, and with the support of external stakeholders; student projects, academicians, manufacturing consultants, and design agencies (See Task T10 in Table 23). Meanwhile, due to the technical challenges of the product concept, market research outcomes (market size, customer segments, contextual information on region/country) were frequently revisited to formulate target market segments and usage scenarios appropriately. In the following stages, the prototyping process was accompanied with a usability study in order to test the product for the target group fit and its usability over time.

During the agile development of food preservation case (Case 1), the prototyping process was accompanied with the insights (user research outcomes, market segments, usage scenarios) generated during UX-driven development. Prototyping took place as an iterative process having ideation and prototyping sub-cycles. It continued in order to test the prototypes regarding their efficiency in the physical context of the BoP and their fit to the corresponding usage scenarios. For the cooking case (Case 2) prototyping continued along with the ideation phase. Prototypes that resolved the concerns and that achieved the strategies of the project, were prepared for mass manufacturing.

7.2.5. Phase 5. Production

The production phase of the food preservation case (Case 1) was moderately observed due to my limited participation in the agile product development team by 2018. Based on the personal communication with an agile team member (M.S.) on August 3, 2017, production for the BoP did not show significant differences due to the company's standard mass manufacturing process know-how (See Section 7.3.4). Whereas, the formation of the business network, supply chain, and logistics gained acceleration along with the production. The collaborations were again central in managing the market entry process and reaching targeted people in African countries with diverse cultures and authentic characteristics. Meanwhile, the challenges faced by the agile product development team were regarding the cultural differences, communication barriers, and infrastructural problems in local areas, and were making it hard to apply the steps systematically to enter the market.

To conclude this section, designing for the BoP needed a different treatment compared to conventional new product development practices of the multinational company. The primary goal of both the new product development process (Cases 1-2) and collaborations (Cases 3-8) for the BoP communities was to facilitate the learning process about the unfamiliar problem context. Collaborations facilitated information exchange and empowered the team for missing competencies.

The non-linear, iterative phases served as the building blocks for the generation of the necessary know-how. Strategy development took place above each product development case and involved decision-making about the development themes, and the relevant planning activities of these. Scouting and ideation phases supported each other to fill the gap with a novel idea. Prototyping and production phases took place consecutively, and they were based on the exploration of technical capabilities. The process was accompanied with methods and tools, which also showed adaptive qualities. The following section introduces the methods and tools.

7.3. The Adaptation of Methods and Tools for Designing for African BoP Communities

This section presents the way methods and tools were utilized for the BoP domain.

7.3.1. Trend Analysis for Designing for the BoP

The company's product development strategies were determined with respect to the observation, analysis, and discussion of qualitative and quantitative information about social and technological patterns. The product development team kept track of worldwide trends and discussed them on a frequent basis via reporting and workshops. Through the analysis of the documents, the trends were observed to include but not limited to:

i. Consumer trends (the rising patterns in consumption),
ii. Socio-cultural trends (values of societies),
iii. Micro-trends (instances of impulsively popularized products),
iv. Technological trends (technology-led transformations),
v. Mega-trends (any major movement in a society),
vi. Meta-trends (trends affecting everything at once).

Information on trends was obtained from consultancy reports and by gathering

exemplary product cases through the Internet and technology magazines. They were evaluated through a series of internal meetings. In this evaluation, their relevance to the company's target countries and communities were of importance.

For the case of Africa, trend reports from consultancies and governmental organizations (such as McKinsey, World Economic Forum, Mail&Guardian Africa and local agencies) showed the growing potential of African countries. These reports envisioned the rise in the African population in the next years, together with an increase in the market size. They provided opportunity fields for product and service development such as food, energy, housing, transportation, and health, which were useful to include in the design brief.

7.3.2. Market Potential Analysis for Designing for the BoP

The market potential analysis was carried out for guiding business and product requirements-related decisions. The analysis of the market-related documents showed that the quantitative data analysis defined the market with respect to:

i. Target market (Addressable consumer groups),
ii. Size of the market (Addressable households/persons),
iii. Geographic boundaries (Addressable countries),
iv. GDP (Income-level of targeted consumers),
v. State of competition (Competing products/brands on the market),
vi. Product price range (The price of similar products),
vii. Market share (Percentage of products/brands available).

Market potential analysis began by defining a region (e.g., Africa) with strategic importance. The product development team examined the region with respect to economic and social indicators. The examination took place by analyzing the governmental and non-governmental databanks, providing statistical data per region. Through this examination, the team listed potential countries and socio-economic groups in them. Once a socio-economic group (e.g., low income) was determined, the country-wise evaluation was made for maximum population coverage. This evaluation allowed to determine consumer segments and provide

demographic patterns such as population number, family number and average size, and labor characteristics.

This analysis worked to define socio-economic consumer segments by considering strategic factors. Once the gap was identified, customer segments were examined based on their quantitative characteristics (Figure 49). Addressable household/user potential was calculated with respect to statistical reports. When the consumer segments were defined, the key factors were described for customer access, and targets were set to reach them.

Figure 49. Representation of market potential analysis.

Market estimation for the BoP context was realized through secondary research. In this, the resources were (i) company documents, (ii) consultancy reports (e.g., McKinsey, WorldEconomic Forum, KPMG Africa), (iii) governmental data sheets (e.g., World Bank, Food and Agriculture Organization (FAO)), (iv) international institution reports (e.g. United Nations Development Programme (UNDP), The Organization for Economic Co-operation and Development (OECD), International Energy Agency (WEO), International Labor Organization (ILO), International Finance Corporation (IFC), New Partnership for Africa's Development (NEPAD)), (v) non-governmental data sheets (e.g., Worldwatch Institute, World Resources Institute (WRI), Practical Action), (vi) Internet/Blogs/Forums (e.g., Mail&Guardian Africa, New York Times), and (vii) academic papers.

Often, the product development team experienced difficulty in accessing and validating data, resulting in data comparison across multiple platforms. Market potential analysis for Africa was a controversial topic in itself. Official reports and databanks offered access to information such as population size and monetary poverty rates. However, limited country coverage across Africa, variance across different sources, and only outdated information availability decreased the effectiveness of these reports. Moreover, knowing that the design field contemporarily benefits from holistic poverty approaches, instead of monetary poverty approaches, the reports were not effective in guiding the design process in a human-centered way (See Section 4.1.1).

7.3.3. Product Analysis for Designing for the BoP

Another method in the formulation of the strategic position of the company was the analysis of the competing products on the market. The research into the products in the market aimed at finding an innovation gap that was not addressed before. This stage took place by comparatively assessing the strengths and weaknesses of the existing products. This step also included the analysis of conceptual and commercialized products, patents, alternative materials, and resources.

The team members had carried out the core product analysis before I joined the team. However, the insights from this analysis were discussed frequently during product strategy meetings. In these meetings, the commercialized ideas were evaluated by means of product-related characteristics and their business strategy. They were analyzed with respect to the projected strengths and weaknesses. However, the access to information on their technical specifications was quite challenging.

Product analysis continued through the project by reviewing technology/business magazines, and social media for traditional solutions adopted by local communities, and conceptual and commercialized products by other firms, local SMEs, startups/entrepreneurs, design students, and social designers. Major body

of products belonged to the category of conceptual products, indicating the complexity of the problem context, and limited know-how in embracing the cultural and technical challenges. Moreover, the conceptual product examples were mostly from European/American designers or design schools based in developed countries (Table 20). They introduced design competitions and advertised the power of innovation for the BoP contexts.

Table 20. Technology/business magazines promoting the BoP innovations.

The U.S.	**The U.K.**	**The Netherlands**	**Other**
Insider	Unilad	Greenpeace	Playground (Spain)
Design Other 90 Network	Dezeen	Waarmakers	TreeHugger (Distributed locations)
Good	Zinc		Harvard Business Review (Canada)
Codesign			BoP designer daily (UAE)
Inhabitat			Core 77 (Distributed locations)
Mashable			
Impatient Optimists			

Through product review and analysis, the competitors were recognized. On the other hand, this analysis also helped to identify the actors as potential partners. For instance, on the decision to address a strategic hunting field for the BoP domain, a local startup was identified and partnered (Case 8). This was mutually beneficial for both ends; while the local startup received support for commercialization, the company acquired the innovative concept and gained competitive advantage effectively within a short period of time.

7.3.4. Product Development Process Methodology for Designing for the BoP

Product development process methodology was chosen based on the objectives of the company. The methodology of the product development process was observed to influence the resources and the focus of innovation. The company was using PEP (also referred to as product engineering process, or product emergence process) as a standard product development process methodology. PEP is a product development methodology that attaches importance to the development of

product/part innovation systematically considering efficiency. It ensures quality improvements, reduced cost and time, reduced investment in manufacturing tools, and transparent and measurable processes (Ayayüksel and Kocaçınar, 2009). There are multiple PEP flows customized based on the company sector. Briefly, it starts with planning and design, and is followed by execution and follow-up marketing (H. E. Torun, personal communication, December 31, 2018). The following table presents a PEP process with eight phases (Table 21).

Table 21. PEP phases (Based on online PEP training of BSH).

Phase 1	***Requirement Engineering:*** Specification of the project details regarding cost, quality, work, schedule, headcount, sponsors, and resources.
Phase 2	***Concept Development:*** Forming CAD drawings and models, testing them with simulations.
Phase 3	***Project Planning:*** Planning of the project for realization.
Phase 4	***Product and Process Development:*** Calculation of the costs of labor, working hours, return on investment, tooling and consumption, infrastructure, maintenance, insurance, and energy; assessment of the quality (such as pressure and endurance).
Phases 5-6-7	***Pre-pilot / Pilot / Series Production:*** Planning, test, and initiation of mass production.
Phase 8	***Assessment of project goals:*** The project is assessed based on quality, timing, and cost. The decisions are made by referring to the project status, quality, time schedule, cost, supplier, and risk evaluations.

Although the BoP product development project started with and was shaped by the methods presented, the challenges and opportunities faced by the product development team revealed the peculiarities to treat the problem domain in a different way. Innovative product development for the BoP communities required a distinctive approach compared to conventional product development methodology followed in the development of home appliances (i.e., PEP). It was an evolving decision regarding the challenges and opportunities that emerged through the project.

The food preservation case (Case 1) started with PEP methodology. PEP was accompanied with other methodologies; UX-driven, and agile development in the long-term (Figure 50). Agile development took place at the execution phase of PEP (H. E. Torun, personal communication, December 31, 2018).

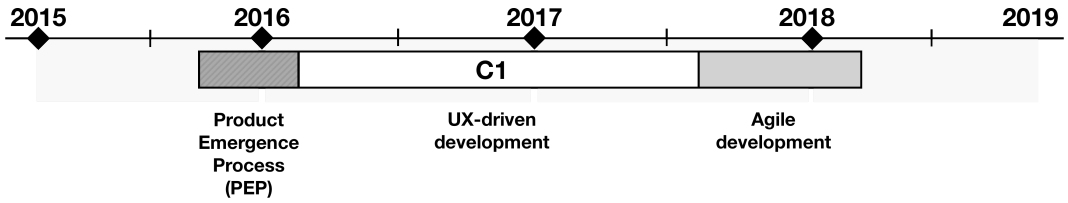


Figure 50. Product development approaches for Case 1.

The product development methodology was not only a decision made regarding the project duration; it was rather a decision based on the long-term advantages. At first, the cases involved engineers from backgrounds of electrics and electronics, mechanics, material, food, and industrial engineering. Along with HCD, it was seen that the skills of the team were likely to influence the focus of innovation (i.e., material innovation, mechanical innovation, or human-centered innovation, etc.).

Therefore, although team formulation was depending on PEP tradition at first, after applying UX-driven development (HCD), the product development methodology turned into an influential factor in the way the teams were built. Moreover, during the agile development, factors such as market strategy, competition, and confidentiality influenced the team formulation:

- **Market strategy:** A BoP innovation project had to be carried out in a short period in order to increase the company's competitive power with the product on the market.
- **Competition:** An innovative product's perception of novelty would expire very quickly. Therefore, it needs to be on the market in a very short period of time.
- **Confidentiality:** As the product concept, form, material, and technique are not always developed using the resources of the company, and because the development process is a collaborative act, projects need to be completed in a short period of time.

Moreover, the teams were trained on agile methodology and user-centeredness to apply throughout the scrums. Other than BoP, these teams were prepared to embrace the complex topics of the future.

All in all, the methods, comprising trend analysis, market potential analysis, and product analysis contained several constraints in depicting the demands of the BoP communities. However, they supported the decision-making process by enabling various knowledge creation channels. Moreover, product development methodology had a significant impact on the resources of the company that impacted the way knowledge was created and utilized, and teams were formulated.

As a summary of this chapter, Figure 51 shows the overall picture of the company's new product development for African BoP communities. It depicts the development phases, applied methods, tasks, and actors involved in the process.

7.4. Conclusions to Chapter 7

To sum up, designing for the African BoP communities was a complex process, given that the company had an established NPD tradition and it needed a delicate transition between PEP and human-centered approaches concerning the resources and considerations of the company, competencies of the product development team, and the constraints of the BoP context. Moreover, the application of the human-centered approaches through UX-driven development came with its own challenges and opportunities.

Nevertheless, scouting, ideation, prototyping and production phases show similarity with DT approaches in the literature, which can be briefly characterized with the discover, define, create, and evaluate modes (Luchs, 2016).

The availability of an additional phase, strategy development, indicates that the designer could also impact the organization for long-term resource creation. This is an important finding because HCD/DT categorizations embrace NPD as a creative process alone and misses the reality that the product development is a process with strategic assessments upfront. Indeed, the products are the end results of the resources of a company that are shaped during strategy development. Meanwhile, the contribution of human-centered approaches goes beyond empathy with people, extends to empathy with the organization on

grounds of gaining familiarity with the strategic objectives and resources shaping them. This helps the designer to see the bigger picture that increases the impact that the designer creates at an organizational level.

Table 22 summarizes the phases with respect to the company's objectives, methods and tools, and provides the methods of HCD.

Table 22. NPD aims, objectives, methods, and tools.

Phase	Strategy	Scouting	Ideation	Prototyping	Production
Aim	Set a business goal; build resources; initiate, continue or end a project.	Obtain value propositions and usage scenarios for certain segments.	Gather product concepts and business model ideas together.	Test product concepts; develop materials, improve product usability.	Prepare product for mass manufacturing.
Objectives	Enter BoP market.	Conduct market research.	Gather viable, and appropriate technology concepts.	Ensure technical, human-centered, and contextual feasibility.	Refine product design.
	Increase brand awareness.	Define segments.			
	Apply contemporary methodologies.	Develop value propositions.			
	Increase innovation power to compete.	Form usage scenarios.			Mass production.
	Increase employee engagement.	Validate product concept viability.			
		Formulate opportunity fields.			
Methods	Trend analysis	Market potential analysis	Internal and outsourced	Tests (Lab test, physical test, software test, simulations)	PEP and Agile
	Market potential analysis				
	Product analysis	Product analysis			
	Product development methodology				
Tools	-	Empathy map	Business, and value proposition canvas	Software	-
		Value proposition canvas			
Methods of human-centered data collection	Secondary research	Collaborations	Collaborations	Secondary research	-
		Secondary research and literature review	Focus group discussions (Co-design)	Usability study	
		Distant visual ethnography			
	Expert opinion	Photo survey	Creative workshops		
		Field observation			
		Focus group discussions			

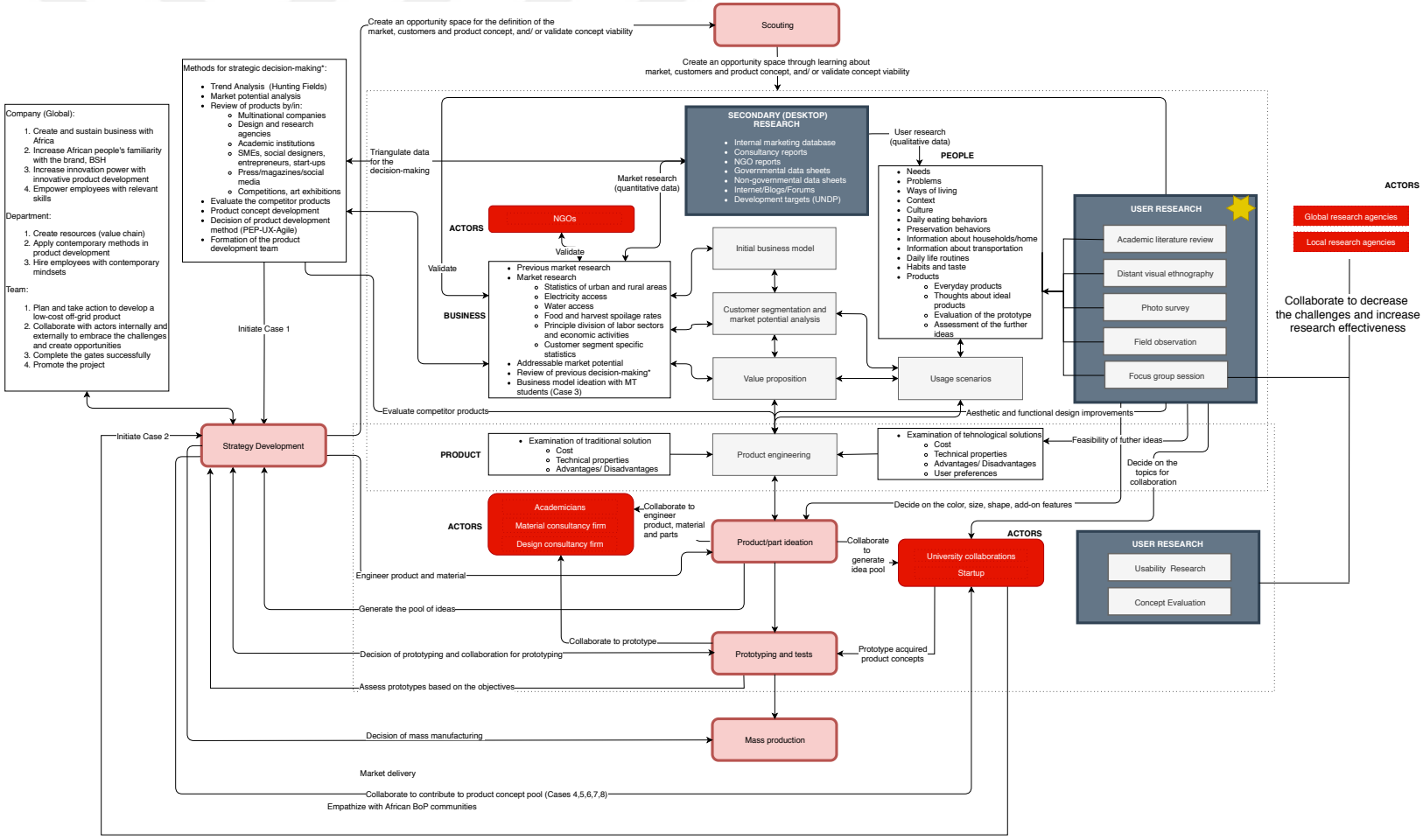


Figure 51. NPD process for the BoP communities.

CHAPTER 8

ANALYSIS OF THE ROLES THE DESIGNER TAKES

This chapter discusses the roles that emerged throughout the new product development process. In search of answers to the research questions, respectively, the first section exhibits the strategic position of the designer in the company. The second section lists the tasks that the designer was involved in. The third section presents the roles concerning these tasks. Finally, the fourth section provides the mindsets/skills of the designer.

8.1. Human-centeredness as a Strategy

Adopting contemporary approaches in product development is an essential strategy of BSH Home Appliances. On the webpage, BSH Hausgeräte GmbH, (2018b) explains that people, products, and processes should continuously be improved to succeed. The company sets visions to adapt to today's and future's competencies and describes the *continuous improvement mindset* as a strength the company has.

Moreover, the company's motivation is being the first choice of consumers by providing superior technology that goes further than the expectations. The path to this target is associated with the capability of customer-centeredness and enriched user experiences (BSH Hausgeräte GmbH, 2018b). In achieving this target*, user-centered approaches* gain strategic importance.

Also supported with the observation, the global company embraced the methods and tools of user experience (UX) and design thinking (DT) together as part of the continuous improvement mindset, in order to leverage the problem-solving and innovation capabilities of the innovation teams. In many cases, they were treated as catalyzers of impact due to their potential in gaining empathy with people, their real needs and expectations (See Loehmann, 2018; Fan, 2018). The company was

not differentiating these two approaches, and instead, it was offering a mutual relationship between them. In parallel with this, *UX research* was becoming a practice of application and its methods were disseminated inside the organization.

The global company's perspectives on user-centered approaches influenced my position in the team. I was the only UX researcher in the local company (Turkey). Nevertheless, I was working for the innovation department in Germany from Turkey. Correspondingly, I was able to take flexible roles by applying contemporary approaches in design and research.

This state was influential in a range of tasks I played a role in, from designing UX research to the mediation of ideation, collaboration, or assessment due to designerly skills that the organization needed. Moreover, I was expected to apply and disseminate user-centered methods in the practices of the innovation teams. These tasks are elaborated in the following sections.

These tasks were not only grounded in user-centeredness, but they were also associated with *human-centered design* (HCD) (See Section 2.3 for further information). Although the company did not name it as human-centered design, it was observable through the course of product development, and the roles taken in this process. Seeing HCD and DT as interconnected aspects of design, Tim Brown (IDEOU, 2018) describes them as human-centric approaches to the innovation drawing from designerly ways of thinking and doing, which incorporate people's needs, technology possibilities, and business requirements. Based on this definition, human-centeredness differs from user-centeredness on the grounds of empathizing with all stakeholders.

Apparently, IDEO's definition of HCD and DT applies to my design practice within the organization. My practices were in line with this definition on the grounds of embracing human needs, technology, and business together. Through the course of product development, I was an interface between the engineers and African people, and an advocate who communicated the needs and characteristics of the BoP communities. I was able to understand technical barriers in product development; I was proposing solutions and assessing the alternatives to combat these barriers. I was aware of the business targets, and resources (time plan,

budget, workforce) of the organization, resulting in the formulation, and communication of the convenient methods for data collection. Moreover, by considering the human perspective in every aspect of the product development process, I was mediating the communication between the stakeholders. Therefore, I operationalize IDEO's "human-centered designer" term to describe my role within the organization grounded on the tasks I was involved in.

Showing that human-centered design is a strategic approach in the product development process of the company, the next step is revealing the tasks in which I played the role of the human-centered designer. The following section presents these tasks.

8.2. The Tasks the Human-centered Designer was Involved

The following table gathers the tasks I was involved in as a member of the product development team. The table shows the content of each task (second column), distinguishes the cases the tasks belong to (third column), and provides the phase in which it happened (third column) in the product development process. The tasks (first column) are numbered in chronological order. They are grouped according to the workflow of the same tasks dispersed throughout the product development process.

Table 23. Tasks for human-centered design practice.

Task	Task definition	Case	Phase
T0	Learning about African market strategies through meetings and reports.	Food Preservation (Case 1)	Strategy
T1	Market research and segmentation based on the characteristics of the BoP communities in a certain: • Region • Country	Food Preservation (Case 1)	Strategy - Scouting
T2	Stakeholder search for collaboration: • NGOs • Governmental organizations	Food Preservation (Case 1)	Strategy - Scouting
T3	Secondary research	Food Preservation (Case 1)	Strategy - Scouting
T4	Value proposition/Usage Scenario	Food Preservation (Case 1)	Strategy - Scouting

Table 23 (cont'd)			
T5	Brief development to guide the research procedure of • Visual ethnography • Comparative photo survey and open-ended questionnaire • Field research	Food Preservation (Case 1)	Scouting
T6	Field observation and focus group discussions: • Brief development • Research design • Search of agencies • Hypothesis development • Screener sheet examination • Observation guide development • Reporting the observation and the FGDs. • Analysis of the findings	Food Preservation (Case 1)	Scouting - Prototyping
T7	University collaborations with: • ITU, Istanbul-Turkey • METU, Ankara-Turkey containing: • Brief development • Ideation WS of students with African workers • Technical WS of students with engineers • Preliminary jury participation and assessment • Final jury participation and assessment • Newsletter/Brochure texts to promote the collaborations internally and externally	University collaborations (Cases 4, 5)	Ideation
T8	Comparative photo survey and open-ended questionnaire: • Photo documentation and analysis	Food Preservation (Case 1)	Scouting
T9	Facilitation for user-centered design improvements: • Ideation workshops • Collaboration with engineers	Food Preservation (Case 1)	Ideation - Prototyping
T10	Product concept assessment: • Startup • Student projects at ITU and METU	University and startup collaborations (Cases 4-8)	Strategy - Prototyping
T11	Video making and visual presentations: • Product concept and usage scenario video • Field study video • Moderator education video	Food Preservation (Case 1)	Production
T12	Creative facilitation and research framework for the management trainee students in Germany	Business Model Ideation (Case 3)	Scouting
T13	Expert interviews	University collaboration (Case 5)	Scouting
T14	Usability research • Planning, brief • Local/global research agency search, contact • Manual • Product addition • Screener sheet examination • Collaboration with the UX team in Germany • Moderator video • Diary design • Analysis, reporting	Food Preservation (Case 1)	Prototyping

Table 23 (cont'd)			
T15	Conceptual idea evaluation tool development	Food Preservation (Case 1)	Prototyping
T16	Design thinking tool development for ideation workshops	Cooking (Case 2)	Strategy
T17	Mentoring and consultancy	Cooking (Case 2)	Strategy

The following section explores the roles of the designer based on the tasks provided in the table.

8.3. The Roles of the Human-centered Designer

The emergent roles for design practice was presented in Chapter 2 (See Section 2.1.1). Through the course of the product development process, six major roles were identified as (i) user researcher, (ii) frame creator, (iii) creative facilitator, (iv) collaboration mediator, (v) evaluator, and (vi) inspirer, through BoP product development in the multinational company. These roles were distinguishable by being involved in multiple cases ranging from product development to collaborations (Cases 1-8), and through the accomplishment of the tasks presented in Table 24 (Also See Table 23 for the Tasks). In the following sections, an elaborated description of the roles is given with respect to the findings in Chapter 6.

Table 24. The roles of the human-centered designer.

Tasks	**Cases**	**Roles**
T0, T1, T3, T4, T5, T6, T7, T8, T13, T14, T15	C1	User Researcher
T0, T1, T2, T3, T4, T12, T17	C1, C2, C3	Frame Creator
T9, T12, T16, T17	C1, C2, C3	Creative Facilitator
T2, T6, T7, T9, T14	C1, C4, C5, C6, C7	Collaboration Mediator
T10, T15	C4, C5, C6, C7, C8	Evaluator
T7, T11, T17	C2, C3, C4, C5, C6, C7	Inspirer

The following sections present the roles of the designer built on the findings in Chapter 6.

8.3.1. User Researcher

Kelly and Littman (2005) reported the usefulness of the anthropologist role for innovating companies. By observing the product development team, having challenges in product design decision-making, I catalyzed the action for carrying out field research in Africa where I was going to play the role of an anthropologist and a researcher (Tan, 2009; Raijmakers et al., 2012). Nevertheless, this was a process in which the objectives of the product development team, the department, and the global company have to be reconciliated. I contributed to this process as a capability builder (Tan, 2009) on behalf of being able to carry out research in Africa as a team and transmitting HCD and DT approaches to the entire team, which contributed to the *organizational learning* (Brix, 2017). Though, it was made possible in steps, which I summarize as follows.

Immersion:

At the beginning of the product development process, my contributions were asked especially in the development of a value-driven business model, finding contacts for NGO meetings (collaboration), and supporting supply chain decision-making in food preservation case (Case 1). Besides, I was informed about the pre-planned market survey, which could be used to statistically define the market concerning household characteristics and basic needs (See Section 6.1. Immersion). These expectations were primarily rooted in my T-shaped skills (IDEO, 2015).

UX approach:

On the first day of the project, the project leader and I analyzed the project progress, work packages, and the team's skills. Based on this, I specified my interest in applying a procedure built on the UX approach. The project leader showed interest in this approach. Moreover, I began to carry out daily/weekly meetings with the project leader, examined available documents about Africa, and initiated secondary research about Africa (See Section 6.2. Engagement, Framework Creation, and User Research).

Market research:

The market research showed that African societies were culturally diverse, resulting in countless ways of living and quality of life needs. The difficulty in accessing credible data about market size made it challenging to foresee the accuracy of the customer segments. The awareness regarding the benefits of field research increased the demand to conduct research in the real context (See Section 6.2. Engagement, Framework Creation, and User Research).

Secondary research:

The aim of secondary research was providing information about the market (food spoilage, food types, spoilage reasons, customer segment-based spoilage), ways of living (economic activities, rural/urban division), cultural characteristics (with respect to literature), sectors of principle activities, physical context, and potential usage scenarios for different customer segments in different countries. Additionally, I incorporated the literature driven perspectives to our analysis such as Maslow's hierarchy of needs (Maslow, 1943) and Hofstede's cultural differences index (Hofstede, 1984; Hofstede Insights, 2016) to describe the characteristics of targeted African countries (See Section 6.2. Engagement, Framework Creation, and User Research).

Distant visual ethnography:

I communicated my willingness to incorporate the human-centered approach into the product development process. The need to carry out ethnographic research was evident to make product development process decisions more confidently. The literature also pointed at the necessity to carry out a field study to gain empathy with diverse African BoP communities. The team had videos of ethnographic research informing about the daily needs and behaviors of a middle-income customer segment in a Northern African country. However, no ethnographic research for the African BoP communities was carried out before. To combat this challenge in the first place, I utilized visual ethnography research tools. I initiated research using ubiquitous technology tools: Google Earth, YouTube, and Vimeo. Being the most populous country with diverse cultural and

contextual characteristics, I took Nigeria as a sample for analysis, which I examined under eight zones. I reached three types of information with distant visual ethnography: (i) housing, (ii) transportation/infrastructure, (iii) patterns in urban areas about human, place, and objects in daily life. Distant visual ethnography research informed customer segmentation phase by accessing the material culture in Nigeria (Figure 52), and it was accompanied by quantitative data obtained from market research (See Section 6.2. Engagement, Framework Creation, and User Research).

Figure 52. Distant visual ethnography research method *(Photos on the left, locations on the right map).*

Brief development for research:

In order to see alternatives in field research and evaluate feasibility considering the resources of the project, I was tasked with preparing a short brief to communicate with local and global research agencies. During the planning phase of the field research, I developed a guide for qualitative research that addressed:

- Everyday living, daily needs, and problems: To gain empathy with people and the context.
- Projected market segments and description: To validate market segments and people's way of living.
- Needs and behaviors related to problem scope: To validate value proposition and usage scenarios.

This guide defined the purpose of the research and included a brief summary of market segments, research methodology, and research questions. It provided the

basis for data collection, and it was revised according to the research strategy and to whom it was communicated during the new product development process (See Section 6.2. Engagement, Framework Creation, and User Research).

The type and depth of the qualitative research were tied to the strategy and the resources of the project. Therefore, different qualitative research methods were considered and applied subsequently: (i) comparative photo survey, (ii) field observation, (iii) FGDs, and (iv) product usability test.

Comparative photo survey and open-ended questionnaire:

The first step was a comparative photo survey and open-ended questionnaire. The survey was carried out simultaneously in a developed and underdeveloped Sub-Saharan country by collaborating with a German research agency[59] whose claim was quick and inexpensive completion of demand with the highest possible quality. The research agency could not guarantee how many participants they could reach, given the research model of the research agency was based on hiring local moderators upon demand. However, this type of research allowed the team to assess the quality of the data generated till that moment, understand the collaborations could be carried out with minor risks, and there were different field research options that could be chosen based on the resources of the organization.

The agency delivered photos taken in these two countries in a period of two months and those involved eight participants from the developed, and two participants from the underdeveloped country. This survey provided visual information about house types, water access, food storage, food preservation methods, and current food preservation products. Besides, the open-ended questionnaire provided information for:

- electricity access duration,
- transportation means,
- clean water access,
- daily diet,

[59] The name of the firm and country details are not given due to confidentiality.

- products for food preservation,
- spoilage information about food types,
- alternative food preservation methods,
- perception of spoilage,
- projections about the place of usage of the product concept (Case 1).

I analyzed the outcomes of the survey and documented the insights to validate available customer segmentation data. Although this type of research did not effectively reveal people's needs and behaviors, it allowed the research team to sense the African context and a quick grasp of the way of living/quality of life on a comparison basis. Meanwhile, the product development team was improving the prototype with respect to effective and efficient cooling. Once we saw promising values, we decided to take the prototype to the field, in order to test the acceptance of the concept, and validate the insights generated till that moment. That was to say that conducting field research was feasible at that point (See Section 6.2. Engagement, Framework Creation, and User Research).

Field observation:

The research was carried out with a research agency regarding the challenges of field research in Africa. This time, I mediated the communication between the stakeholders: the team, the global research agency, and the marketing department. I developed the research methodology and the list of research and interview questions that the global research agency team and the local research team would go through concerning comprehensibility and cultural differences in meaning. The project leader especially asked my involvement in this stage because of my familiarity with the strategic targets of the team and the company.

Field observation was loaded with achieving multiple targets at once:

- Validation of needs/problems,
- Validation of market segments,
- Acceptance of the product and the usage scenario,
- Analyzing competitors and other brands in the region.
- Analyzing local solutions in the problem area, and

- Scouting for new problem areas.

In this direction, I primarily developed an observation guide for the team to take notes about the context (Figure 53). The guide issued the points that were communicated in the early phases of the product development process. Besides, it aimed to gain awareness about the team's experience of the context using the five senses. Although it eased the conversations among the team members on certain points, the rest of the team could not fully utilize the observation guide. Nevertheless, the notes in the observation guide informed the decision-making process of the next prototypes' form and color alternatives.

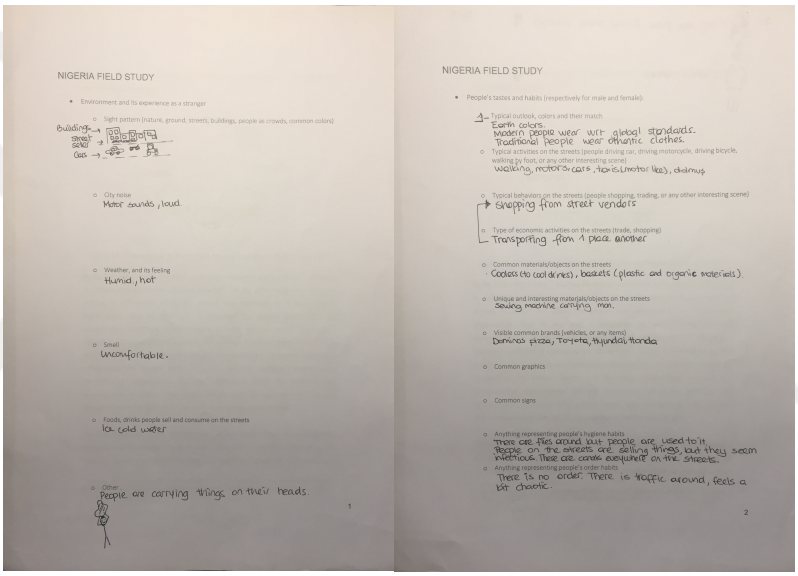


Figure 53. Observation guide.

The observation took place in Lagos, Nigeria, between May 22-29, 2016. As the product development team, we observed urban areas and two marketplaces. We traveled the city with local guards from the local research agency and for most of the time by car due to security reasons. We documented the surrounding, urban patterns, transportation means, people's taste, and way of living with photos and videos taken with a smartphone. Besides, we recorded information about specific targets such as food preservation methods, preservation products, and preservation behaviors. Later on, we used these photos to communicate the project progress inside the organization, discuss African needs/problems, and make video

presentations (See Section 6.3. On the Field for Observation and Focus Group Discussions).

Focus group sessions:

The focus group sessions were the essential reason for our field research, and they needed planning. Before the FGDs, I examined the recruitment sheet and suggested revisions to the global research agency considering the targets of the team. The recruitment of the participants was observed to be in line with the team's considerations.

I took notes during FGDs, compared and analyzed data simultaneously and observed whether there was any information loss during moderations. Meanwhile, I formulated the spontaneous interests of the product development team into communicable research questions. The research procedure was modified regarding the product development team's specific questions.

The project leader and I observed that visual ethnography was an efficient method when combined with quantitative data to formulate customer segments, during the field research. Nevertheless, the field observation showed the nuances and fallacies in our understanding and revealed the local tactics, which were not accessible through secondary research. Together with focus group sessions, they empowered us to decide with confidence, by being supported with the insights obtained from users (See Section 6.3. On the Field for Observation and Focus Group Discussions).

Research analysis:

After the field observation and FGDs were realized, I delivered a report containing the outcomes of secondary research, observation, FGDs, and user-centered improvement headlines along with detailed FGD notes for each session. I suggested analogies for the product concept's value proposition based on the perception of FGD participants. This report was adopted by the team for leading the discussions about user-centered aspects. For the next three months after the field observation, the product's user-centeredness was embraced by the project

leader, design engineer, UX researcher, designer from Germany and an academician (See Section 6.4. Design, Creative Facilitation, and Mediation).

Usability research:

The field research provided promising results for the acceptance of the product concept and perceived usability. However, a tradeoff was found between user-centered additions and low-cost strategy, prioritizing frugal innovation. User-centered product add-ons impacted product cost, which led the decision to primarily go with technical performance improvements. After the technical improvement in performance, usability research methodology was designed by collaborating with the marketing department and the global research agency. Initially, I formed the research and interview questions and designed a methodology. On the grounds of this, the global research agency shared their experiences about which methods are applicable considering the characteristics of the region and the project team's targets. However, the challenges in the region impacted the decisions regarding research methods, place, and selection of moderators. Besides, some tools were developed to prevent the barriers in communication due to the level of education and illiteracy rates of people in the region. In this respect, we made an informative video to ease the comprehensibility of the research procedure. This video was distributed to the moderators of the usability test. Again, to ease the comprehensibility of the product usage scenario, I designed a product manual (Figure 54).

The research team was informed about the political conflict and contemporarily rising terror threat in the region where the research would take place. Due to the challenges, I observed the usability research progress in Africa from Turkey. The research took approximately two months in two countries. I was updated with photos and videos from the field, the progress, and the challenges faced via WhatsApp messaging application and e-mails. I documented these data visually by the date, person, and content. Following the usability research, the organization passed the product development case on to the agile development team for manufacturability (See Section 6.6. Remote Usability Research).

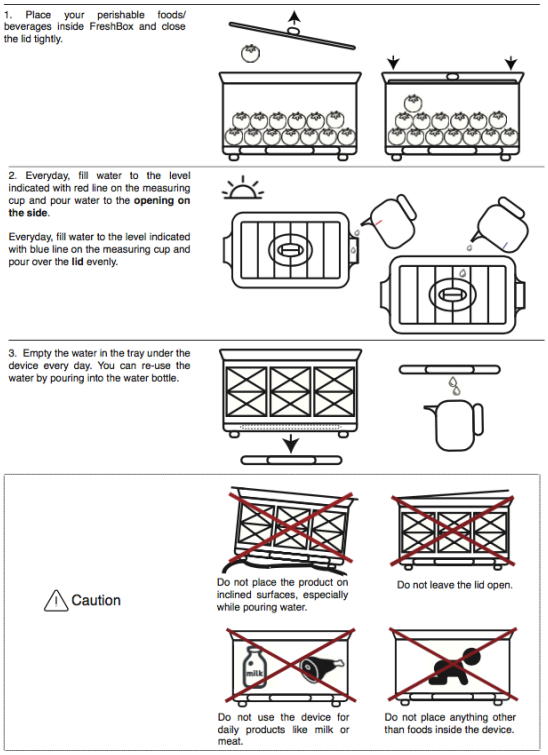


Figure 54. Product manual.

As demonstrated, user research turned into a substantial element of knowledge generation to assess the viability, feasibility, and desirability of the product concept. Prior to including a UX researcher in the product development team, the product team had no intention of carrying user research other than conducting a survey. Seeing user-centeredness in line with the long-term strategic objectives of the company, I communicated the advantages of pursuing user research to lead the product development process responsibly by cultivating empathy for the BoP communities. Although user-centered research seemed risky and costly at first, the team adopted the approach due to long-term benefits. Additionally, the mindset was accompanied by *design thinking* methodology. By experiencing the user-centered product development process with the UX researcher, the team members gained awareness about design thinking methods and tools. Moreover, they began to practice user-centered and design thinking methodologies in other side projects of several departments, influencing the entire organization to adopt user-centeredness as a contemporary approach in product development.

8.3.2. Frame Creator

Frame creator was one of the central roles I played throughout the product development process as part of the efforts to alleviate the ambiguous design process. This was when I played role as visualizer (Diehl and Christiaans, 2015) by making intangible relationships visual and communicable.

I created the first version of the product development framework with stakeholders and their interests (Figure 55). The team positively adopted the framework as a visual guide and used it during strategy development discussions. Starting with this framework in the food preservation case (Case 1), I adapted the same framework for the cooking case (Cases 2) and research phase of the management trainee business ideation case (Case 3) (See also p. 138, p. 161, p. 180, p. 199).

Primarily, it was an effort needed due to four reasons. The first one was the necessity to describe the perceived multi-dimensional problem space. I was introduced to many interests and goals that the stakeholders of the project aimed to fulfill. In order to simplify the complexity caused by this multiplicity, I aimed to reveal, and clarify the stakeholders, objectives, challenges, and opportunities in the design process with holistic/systems thinking approach.

The second reason was the necessity to ease the communication among the members of the multidisciplinary team, by providing a visual tool every member of the team could understand. A visual tool made it possible to illustrate the aspects in which the team members were not on the same page, preventing the barriers in communication. This way, we were able to discuss the elements, the position of the elements, or their meaning. Seeing human-centeredness as an approach grounded in gaining empathy with all stakeholders involved, a visual framework facilitated better communication through the embodiment of the insights normally not communicable.

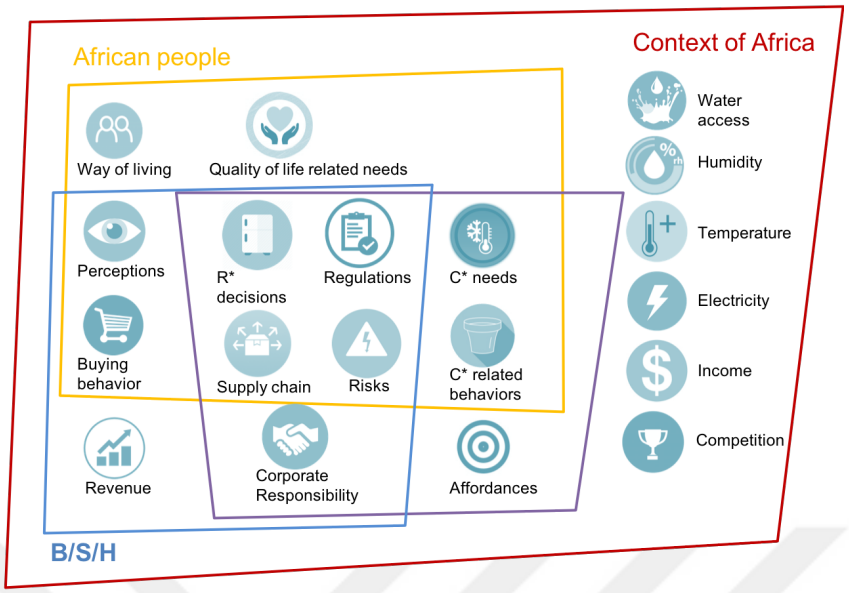


Figure 55. Framework developed for researching the BoP context (Version 1).

The third reason was to propose an informative illustration of human-centeredness. At the beginning of the project, the project team embraced user-centered research similar to market research. By working with a UX researcher, the team gained the awareness to embrace user-centeredness as a qualitative approach, which required methods such as ethnography. A visual tool made it possible to communicate where the focus of interest of a UX researcher was lying at.

The fourth reason was the need to systematize the data collection procedure and plan a roadmap of actions based on this framework. I needed to differentiate the aspects to which human-centered research would contribute positively. By doing so, the work packages of the researcher could be evident.

The framework was able to create positive impact for the better communication of the objectives; I frequently applied my skills in framework development during meetings to discuss the problem context and the understanding of it in a visual way. Due to this end, I was encouraged to facilitate the conversation while taking notes of the categories and associations between the discussed topics. Figure 56 shows the moment I worked on a framework.

Moreover, visual frameworks allowed the knowledge to pass on to other members of the organization. The framework for the BoP research (Figure 55) was shared with the management trainees (Case 3), and another design student involved in the cooking project (Case 2) to guide their research process in a human-centered way. Besides, framework creation was an effective tool to facilitate the learning process of the organization by making the knowledge transferrable anytime, anywhere, to any member of the organization. Most significantly, the transferrable insights resulted in a *learning organization* (Brix, 2017).

Figure 56. Framework creation during meetings.

8.3.3. Collaboration Mediator

Supported with the literature review (See Section 4.1.4. Global multi-stakeholder partnerships), the collaborations were of crucial importance during the product development process to accompany scouting and ideation phases, and overall knowledge accumulation for BoP context. Moreover, the literature for contemporary designer roles points at an emerging practice for designers as collaborators (Kelly and Littman, 2005; Reijmakers et al., 2012) and mediators of

stakeholders (Inns, 2007). And in this, social embeddedness turns out to be a crucial aspect to lead collaborations effectively (Badry, 2009).

Collaborations formed a crucial direction of the new product development process while they aimed at building a long-term value chain, in which their success depended on the communication of the objectives effectively. Hence, it meant that the product development team had to form relationships with the actors successfully; having different objectives, needs, and vocabulary. As a Ph.D. student in industrial design (socially embedded in industrial design circles) and a T-shaped employee (IDEO, 2015) with engineering, sociology, and design backgrounds (See Section 5.5.3. Values and Previous Experience), I mediated the communication between the team and several stakeholders (See Sections 6.2, 6.3., 6.4., 6.5., 6.7):

- **Design thinking specialists in Turkey:** Being closer to the tradition of market research, design thinking specialists in the UX division of marketing department of the local company were not necessarily designers, but they had training in design thinking modules.
- **UX department in Germany:** User experience experts.
- **African workers:** African engineers working for BoP projects.
- **Global and local research agencies:** Qualitative researchers in the agencies.
- **Academia:** Academicians and students from Industrial Design departments (Figure 57).
- **Design agencies:** Industrial design practitioners.
- **NGOs and governmental organizations:** Official responsible**.**

Figure 57. An instance of university collaboration case, METU, October 30, 2016 (Case 5).

8.3.4. Creative Facilitator

Supported with the literature review, facilitation is one of the most significant roles that contemporary designers play in today's world (Inns, 2007; Sanders and Stappers, 2008; Tan 2009; Reijmakers et al., 2012; Diehl and Christiaans, 2015). By showing my interest in applying creative facilitation tools and methods during the food preservation case (Case 1), the product development team members requested workshops in order to leverage the creative atmosphere within the organization. In line with this, I designed workshops for embracing design thinking in the organization; these were facilitated by the colleagues including the project leader. Other than these, I designed a game benefiting from creative facilitation techniques, for gaining management trainee students empathy with people living at the BoP (Figure 58). After this, I took part in design improvement workshops for bringing human-centered aspects into product design (Figure 59) (See Sections 6.4. and 6.7.). Also, by gaining experience in the design of six other

creative workshops other than the BoP domain, I mentored the student designer (H.T.) for her workshops in the cooking case (Case 2). The flow of workshops was inspired by the framework given in Figure 55 on page 230.

Task #	Duration	Method of the Task	Description of the Task
1	5'	**Warm up game:** Random Association	Each participant says a word respectively after each other. The word needs to be a phenomenon/object/person/thing affected from other's'.
2	15'	**Flower Association:** The determinants of Successful Business Models	Participants work in groups of three. They think about the determinants of successful business models. Then they write the words on post-its and stick them on a huge paper. If the facilitator feels the group is stuck, s/he can move the paper and ask people to think more about it.
3	15'	**Guided Fantasy:** Dreaming about the problems of Africa	The facilitator asks the participants to close their eyes and think about what s/he will mention, then begins to talk about the key facts and observations about the region. However, s/he needs to be objective in order not to guide the participants.
4	15'	**H2 Technique:** Dreaming about the innovations for Africa and producing statements for successful innovations	The facilitator tells the participants that they are about to enter a time machine and they will reach to a destination in Africa in the year of 2047. Now Africa is a different place and has solved every problem it faces (e.g. famine, electricity). Then s/he wants the participants to speculate on how Africa might have overcome the challenges and by which mean, using *How to* questions. Before the break, s/he tells that they will continue with the business models for the products they will develop for the region as B/S/H/ in the second half.
	10'	**Break**	
5	30'	**Converge:** Development of a business model for the product innovation ideas	The facilitator asks the participants to think of innovative products that they believe would have changed the conditions in Africa. Among the product ideas, they choose one idea to develop a business model for. Meanwhile, they need to consider the important dimensions of the business models which they developed in the first task.
6	30'	**Presentations:** Presenting group ideas (10x3)	Each group make a presentation about their progress and the route they followed starting from the first task to the last one.

Figure 58. Creative session game flow.

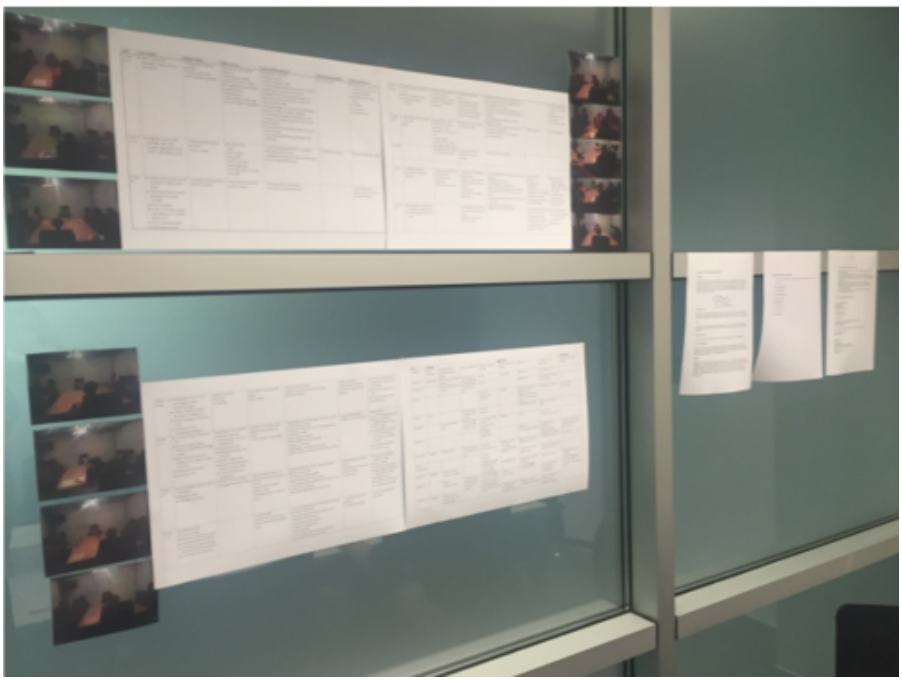


Figure 59. An instance from the human-centered workshop on June 6, 2016.

8.3.5. Evaluator

The literature about contemporary designer roles provides a direction for expanding the number of ideas as a coordinator of exploration (Inns, 2007), provocateur (2009) and instigator (Reijmakers et al, 2012). Nevertheless, in a company in which the pool of ideas was already generated through multiple channels formed internally and externally, it was also necessary to systematically analyze the implications of conceptual ideas and decrease the amount of ideas considering the needs of all stakeholders in a holistic and responsible way. This made the assessment an important task for achieving feasible, desirable, and viable products (IDEO, 2015). Moreover, it was a powerful role to act as the negotiator of value on several aspects such as responsibility (Inns, 2007) or as the strategist (Tan, 2009) with the capability to foresee the future (Sanders and Stappers, 2008; Diehl and Christiaans, 2015).

Based on this concern, the product development team requested me to assess the products with UX considerations. Both in university collaborations (Cases 4-7), and startup acquisition cases (Case 8), I assessed product concepts with the dimensions available in the literature (Figure 60) (See Section 6.5.). Moreover, during collaborations (Cases 6-7), I gave weekly crits to students on human-centered perspectives. These were significant in the exchange of values around human-centeredness and the needs of the company (See Section 6.7.).

However, the observation also showed that the majority of ideas gathered in the ideation phase were conceptual products. Although the dimensions regarding products' relevance to the BoP context were available in the literature (Whitehead et al., 2014, 2016), the assessment of all conceptual products for the BoP context without a proper user research was a challenge. Consequently, the decision makers were in favor of technically feasible product concepts that would contribute to the competitiveness of the company. Moreover, the decision-makers decided on the acquisition potential of concepts based on the concepts' relevance to the projects carried out by the other departments of the company, also asking me to gain familiarity with the projects of other departments. This increased the importance of the role as a cross-pollinator (Kelly and Littman, 2005).

Figure 60. Jury evaluation at ITU (Case 4).

8.3.6. Inspirer

Kelly and Littman (2005) name a role, the storyteller, depicting someone who builds culture through the stories shared in an innovating organization. This was the case for me. Through the course of the product development process, I acted as an inspirer in different cases (Cases 2, 4-7) by communicating my experience in Africa as a storyteller, visualizing our journey by making videos, promoting the project through newsletters, and finally transferring these skills to the other members of the product development team (See Sections 6.4., 6.7.). These artifacts were needed to create the motivation, the trigger for an organizational change to adopt contemporary designerly approaches around human-centered, and responsible perspectives. This also empowered me as an action designer/researcher (Muratovski, 2016).

Starting with the first one, I shared my experience in Africa to inspire the agile product development team members in product development cases (Cases 1 and 2). I was involved in the early phases of the ideation sessions in the cooking case (Case 2) and contributed to the discussions about people's ways of living in Africa with my observation. Similarly, I shared my experiences during university collaboration cases (Cases 4-7) to gain students empathy with the African context (Figure 61).

Secondly, for inspiration purposes, I made videos of the field visit to Nigeria and product concept/usage scenario (Figure 62). The team used the field video during the collaboration cases (Cases 4 and 5) to empathize student designers with the African way of living. The project team shared the product concept and the usage

scenario video with the internal business stakeholders of the project, which created a positive impact among the stakeholders.

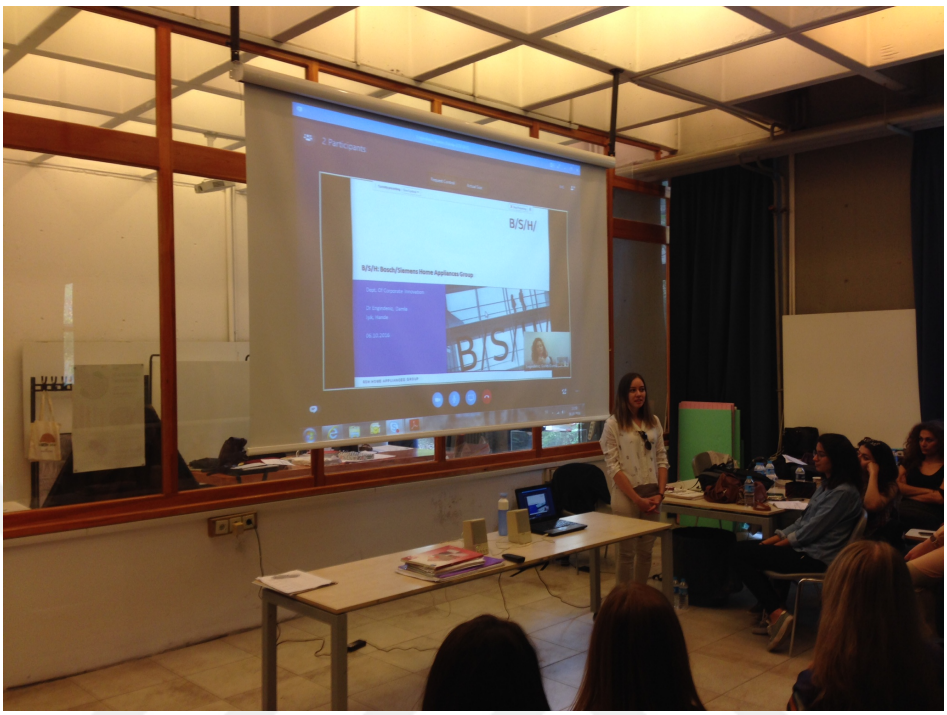


Figure 61. Sharing field experiences with students at METU.

Figure 62. Video making.

Thirdly, during the food preservation case (Case 1), I visualized human-centered suggestions by using hand sketches (Figure 63). The sketches were appraised by the product team members and shared with internal stakeholders.

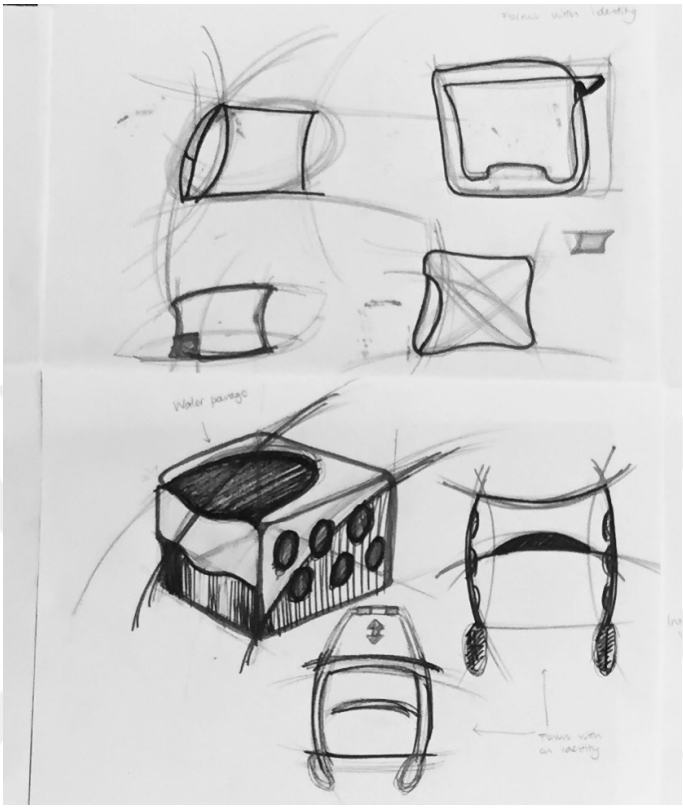


Figure 63. Human-centered suggestions by using hand sketches.

Fourthly, I wrote newsletter articles to inform internal stakeholders and increase the impact of the project in the food preservation and collaboration cases (Cases 1, 4-7).

Finally, during the cooking case (Case 2), I mentored the novice designer (H.T.) to guide her tasks in line with human-centered thinking. The mentoring comprised of familiarizing her with human-centered thinking targets, tools, and approaches to apply during design thinking workshops. This way, organizational learning was possible.

This section has presented the roles I took as a human-centered designer by participating in eight product development and collaboration cases in different product development phases (Table 25). The following section presents the mindsets I had through these roles.

Table 25. Summary of the roles and relevant cases.

Roles	Phases	Case 1	Case 2	Case 3	Cases 4-7	Case 8
User researcher	***Scouting - Prototyping***	Empathizing with African BoP communities				
Frame creator	***Strategy-Scouting***	Embracing ambiguity in the problem context Developing a framework for empathizing with the stakeholders' objectives, and their roadmap	Providing a framework for systematic, human-centered know-how generation to be used during workshops	Providing a framework for systematic, human-centered knowledge generation		
Mediator	***Strategy-Prototyping***	Collaborating with stakeholders Mediating the collaborations			Mediating the collaborations	
Facilitator	***Strategy-Prototyping***	Carrying out collaborative design workshops	Mentoring collaborative design workshops	Designing a creative workshop	Planning collaborative workshops with African employees	
Evaluator	***Strategy, Ideation-Prototyping***				Gathering conceptual products, and assessing them based on human-centered concerns	Assessment of ideas based on human-centered concerns
Inspirer	***Strategy, Ideation-Production***	Inspiring agile product development team for human-centered design progress	Distributing relevant human-centered skills to the product development team members and novice designer		Storytelling to cultivate empathy with the BoP communities	

8.4. The Mindsets and Skills Applied

Several competencies aided the process through the roles I played as a human-centered designer. The following sections describe the major mindsets/skills I applied by showing their relevance to the literature.

8.4.1. Holistic Thinking

Borja de Mozota (2010) approaches holistic thinking as a skill that transforms an organization to a better state through synthesis of information. Whereas, Kramer et al. (2016) provide holistic thinking among the HCD mindsets that allow to see the bigger picture.

Through the product development process, the need for holistic thinking appeared strongly due to the multi-dimensional problem domain. The team needed to be aware of their impact on the social, cultural, ecological, and economic factors. Moreover, the responsibility towards the environment and people with low-income had to be recognized and prioritized.

In my case, my personal motivations and T-shaped expertise (IDEO, 2015) helped me to grasp the bigger picture from multiple lenses (See Section 5.5.3. Values and Previous Experience). Being trained in multiple disciplines; engineering, sociology, and design, I intrinsically synthesized information from various channels as I researched the BoP context.

8.4.2. Human-centeredness (Empathy)

Kramer et al. (2016) explain empathy as a mindset for understanding others' thoughts, feelings, and experiences. For Borja de Mozota (2010), it refers to a skill for understanding other people. Moreover, it is the building block of HCD (Brown and Wyatt, 2009; IDEO, 2015).

Human-centered approach influenced the product development team on the grounds of prioritization of users, the people with low-income in Africa, throughout the new product development process. However, human-centeredness did not only mean prioritization of the BoP communities; the needs of the stakeholders had to be understood for building a value chain that extends to the people in Africa. With respect to this, empathy with stakeholders formed a significant aspect of the human-centeredness in finding the middle way of actions or persuading the actors for responsible decision-making. I gained familiarity with

the objectives of the stakeholders by applying the human-centered mindset (See Sections 6.1, 6.5, 6.7).

8.4.3. Collaborative Mentality

According to Kramer et al. (2016) collaborative mentality is the frequent communication and shared responsibilities towards a common goal.

As shown in the literature review, collaboration with other actors was an indispensable action given the challenges in the process of designing for the BoP (See Section 4.1.4. Global Multi-stakeholder Partnerships). Respectively, the collaborations took place with NGOs, research agencies, universities, academicians, material and design consultancy firms, and startups in order to learn about and act for the BoP communities (See Sections 6.1., 6.2., 6.5., 6.7.). Most importantly, they extended to the BoP communities in Africa (See Section 6.3).

Meanwhile, the T-shaped expertise (IDEO, 2015) helped me throughout the collaborations with the stakeholders of the product development process. Being trained in multiple disciplines, I was asked to communicate the needs of people in Africa to the product development team, translated the needs of engineers to students during university collaborations, and wrote design/research briefs that reconciliated the needs of each stakeholder. Meanwhile, the positive attitude, the transparent share of the objectives, and conflict resolution when needed were crucial to carry out excellent communication with stakeholders, which are in line with the skills listed by IDEO (2015) as openness, curiosity, optimism, and the tendency of learning.

8.4.4. Tenacity

IDEO.org (2015) illuminates embracing ambiguity as one of the mindsets of HCD practitioners. Moreover, Kramer et al (2016) explain tenacity as the determination maintained to overcome the barriers.

Through the course of the new product development process, there were numerous challenges in the face of BoP context and people, business setting, stakeholders of the development process, and product technology, which needed to be managed delicately by the team. These are provided in Figure 64.

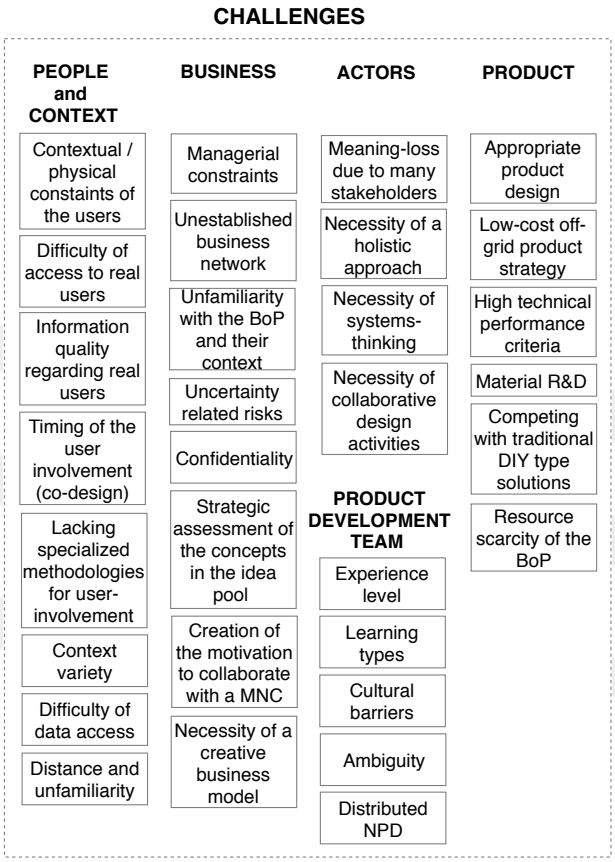


Figure 64. Challenges in the BoP product development process.

With all these challenges, my skills for embracing ambiguity were observable in situations such as frame creation, mediation of stakeholders, user knowledge generation, attitude towards technical challenges, and assessment.

Through the process, I aimed to move the project complexity from chaotic to complex, from complex to complicated, and from complicated to obvious (See p. 47) with the tactics I applied such as frame creation.

The difficulty of the management of the stakeholders in the design process was indeed due to lacking a common terminology. While various objectives needed to be achieved at the background of new product development and they were influential in the decision-making process, these objectives were not readily

communicated. This was the point I intervened by asking questions about the objectives of each stakeholder, especially during collaborations (Cases 3-7).

Other than these, user knowledge generation happened to be limited due to the challenges of the field research. While cultural differences made it hard to gain a proper understanding of people, designing for people without frequent contact had limitations given that the people had authentic needs, problems, and unusual context. To cope with this challenge, different levels of information was generated in steps with alternative modes of research. The ultimate aim was familiarization of the team with BoP communities (See Section 8.3.1. User Researcher).

Moreover, the scarcity of the resources of the BoP context, had to be dealt with innovative approaches. This was an aspect which required creative and out-of-the-box approaches that could be solved with back-to-basics thinking. Through this process, I reminded the team that the solution could be somewhere else, supporting them with optimism and in search of approaches, product examples and similar solutions.

Finally, the assessment of concepts was a challenge given that the team was not familiar with conceptual product assessment. In this step, I empowered the team by familiarizing them with industrial design concepts and expectations from conceptual products through collaborations (See Section 8.3.3. Collaboration Mediator). This made organizational learning possible (Brix, 2017).

8.4.5. Systems Thinking

Having intersections with holistic and complexity approaches, systems thinking aims to reduce the complexity by seeing the product development process as systems, relationships, emotions, experiences, and networks. This helps to visualize systems involving actors, objectives, challenges, and opportunities (Inns, 2007; Diehl and Christiaans, 2015).

By describing actors (nodes) holistically, examining their objectives and expectations (relationships, directions), and revealing the challenges (success or failure of a relationship), I was able to develop a map that brings the holistic and

systematic framework into life (See p. 138, para. 2). The importance of this approach was easing the learning process by making it visually communicable.

By defining a set of nodes, relationships, and the success of these relationships, I provided the team and the organization a tool to trace back failures and opportunities, allowing them to make better decision-making. Product development was an iterative process, in which the product is improved based on the objectives of the stakeholders. A systems-level approach benefited the iterative process on the grounds of examination of the decision-making. It resulted in simplification, which decreased complexity.

Besides, systems thinking provided opportunities to come up with human-centered ideas, by considering the problem domain holistically containing the needs, problems, and context. This mindset benefited the development of business models, products, or services.

8.4.6. Change-Driven Mentality

Through the course of this case, while the means was knowledge creation for the BoP domain, the end was observed as a change in the entire organization. This is also in line with the proposition of Price et al. (2018) who see the designer as an innovation catalyst; the designer creates knowledge and artefacts to learn on a topic, and disseminate these learnings to teach the entire organization. Based on this, I was not only involved in a product development process that aimed to contribute to a disruptive innovation project, but also took part in the facilitation of change in the way business-making happened by applying contemporary thinking and designing skills.

This section has showed the mindsets and skills that were used while taking the roles in the organization throughout the product development process. Table 26 summarizes the analysis in this section.

8.5. Conclusions to Chapter 8

In summary, HCD turned into a strategic perspective in leading the practice for the BoP product development. Through this process, I played six diverse roles, including user researcher, frame creator, collaboration mediator, creative facilitator, evaluator, and inspirer. Moreover, holistic thinking, human-centeredness, collaborative mentality, tenacity, systems thinking, and change-driven mentality formed the basis of the skills applied.

This chapter respectively demonstrated the position of the designer in the product development process, presented the tasks, illustrated the roles taken based on these tasks, and the mindsets utilized during these roles. The following chapter will synthesize the findings into a model, depicting the role of a designer concerning the BoP product development in a multinational company.

Table 26. Mindsets/Skills.

Mindsets-Skills/ Roles taken	Holistic thinking	Human-centeredness (Empathy)	Collaborative mentality	Tenacity	Systems thinking	Change-driven mentality
User researcher	Researching the BoP domain, analyzing the outcomes and transferring the insights by synthesizing multiple perspectives.	Carrying out user research about African people, communicating human-centered suggestions with the team during prototyping.		Managing the cultural differences of the team with African BoP communities.	Generating knowledge by looking from the systems level.	Applying design thinking at an organizational level.
Frame creator	Integrating multiple perspectives in the frameworks.	Integrating human-centered aspects and contextual determinants to the research framework.		Facilitating communication through simple, visual frameworks that guide the team's discussions.	Revealing the actors, objectives, resources, NPD process, challenges, and opportunities.	Designing artefacts to decrease complexity and increase organizational learning.
Collaboration mediator		Mediating collaborations by understanding the needs of the stakeholders.	Collaborating with diverse sets of stakeholders.	Empathizing with the stakeholders and their objectives.		Creating of a long-term value chain by mediating relationships with socially embedded institutions.
Creative facilitator		Planning and executing the workshops for building empathy.	Facilitating discussions of stakeholders.	Triggering out-of-the-box thinking through creative methods and optimism.		Bringing stakeholders together to design collaboratively.
Evaluator	Assessing the product concepts considering viability, feasibility, and desirability.	Assessing the product concepts based on human-centered criteria.		Reaching relevant assessment criteria, communicating these criteria with the team and other internal stakeholders for systematization purposes.		
Inspirer	Developing holistic frameworks and contributing to long-term organizational learning.				Assessing the product concepts holistically by investigating their transferrable qualities.	Working home-office, integrated to the multi-nationally distributed product development team; delivering persuasive texts, photos, videos, and stories; being involved in positive relationships.

CHAPTER 9

MODEL

This chapter introduces the *model of roles* built on the findings of this research. The model aims to explain the role of the designer in the context of the BoP product development project of the company. The model informs practice by showing the contribution of the designer at a wider organizational level. Before introducing the model, the first section summarizes the contextual characteristics of the observed case. The second section presents the dimensions of the model and elaborates the dimensions with the examples from data. The third section discusses the implications of the model for practice. Finally, the fourth section describes the limitations of the model.

9.1. Contextual Characteristics of the Model

Clarification of the contextual characteristics has a significant importance to ensure that readers can relate findings to their context (Lincoln and Guba, 1985; Kivunja and Kuyini, 2017). I have described my own position in Chapter 5 (See Section 5.5) and acquisition process in Chapter 6 (See Section 6.1). This section presents the context of observation by summarizing the key features of the company and BoP strategies in the form of a table (Table 27). The table primarily introduces the characteristics of the observed company, project, innovation target, new product development methodology, and customer strategy (second column). Then, it provides the strategies with their associations to BoP terminology (third column).

The company has a long history in the home appliances sector. It has an established know-how for global market success, with brands associated with *outstanding technology and quality* (BSH Hausgeräte GmbH, 2018b). The company expresses the strengths as unique brand portfolio, trustful partnerships, continuous improvement mindset, and exceptional people in a strong global

network. Moreover, the values are initiative and determination; future and result focus; responsibility and sustainability; openness and trust; fairness, reliability, and credibility; legality, and finally diversity (BSH Hausgeräte GmbH, 2018b). These strengths and values guide the strategies of the company at a global level.

Table 27. Characteristics of the context.

	Typology	**BoP Product Development Strategy**
Company	BSH Home Appliances (BSH Hausgeräte GmbH) is a *multinational home appliances company* headquartered in Munich Germany. Being a joint venture of Robert Bosch GmbH and Siemens AG, BSH Home Appliances has been operating in the home appliances sector since 1967 (BSH Hausgeräte GmbH, 2018a).	BSH Turkey has the biggest of 43 factories across the world, and manufactures products for *Africa, Middle East, Middle Asia, Ukraine and Russia* (BSH Türkiye, 2018b).
Project	The product development case (Case 1) aims to address the needs of BoP communities with a for-profit initiative. The project aims at *creating positive brand image* in Africa with *low-cost and off-grid products* that improve quality of life at the bottom of the pyramid communities (BSH Home Appliances Group, 2018a, 2018b; Torun, 2018).	The product development cases show the characteristics of BoP 1.0 vision (Simanis et al., 2008; Simanis and Hart, 2008) on grounds of seeing BoP as consumers. Nevertheless, it is open grounds for applying BoP 2.0 and BoP 3.0 vision; the knowledge accumulation benefits the strategies for business models aimed at capacity building at the BoP communities.
Innovation Target	The team describes the target of the innovation as *Disruptive/Frugal Innovation.*	The development projects (Case 1 and Case 2) are aimed at achieving *Appropriate/Intermediate Technology* (Schumacher, 1973), for urban and rural areas in Africa. In addition, food preservation case (Case 1) is inspired from *indigenous knowledge* (See Torun, 2018; World Bank, 2018).
Product Development Methodology	The company has an established tradition in product emergence process (PEP).	Food preservation case is carried out using *UX-driven* approach between January 2016-June 2017 and *Agile Scrum* methodology between June 2017 and March 2018. The other new product development case (Case 2) shapes on *Agile Scrum* methodology (Bilge, 2018; Torun, 2018).
Customers	Target users are primarily BoP, and secondarily the floating class, and the middle of the pyramid (MoP) in Africa.	Shows the characteristics of *design for/with the BoP* (Whitehead, 2015), depending on the resources of NPD; users are involved in the ideation and prototyping phases (Case 1).

In the observed case, the BoP product development project was carried out for the first time with the resources of the local company (i.e., Turkey). It showed for-

profit venture peculiarities, yet, it was open grounds for the application of alternative approaches for business models. The practice was both informed by business and BoP theories. The knowledge obtained from new product development and collaborations served a basis for the formulation of upcoming projects.

9.2. The Dimensions of the Model

This section introduces the dimensions of the *model of roles*. Before explaining how to read the model (Figure 65 on p. 255), I would like to introduce the dimensions of the model. The model shows the *contribution* of the *designer* to the company's *method* for embracing a *problem*. Correspondingly, the model incorporates four primary dimensions: method (NPD model), variables (the roles and skills of the designer), problem (BoP), and contribution (i.e., organizational learning). These dimensions are elaborated as follows:

- **Method**. It characterizes the model followed in the NPD process. The type of new product development process may influence the designer's contribution and the roles s/he takes. For instance, a flexible NPD process is open grounds for experimentation of new approaches such as human-centered design (HCD).
- **Variable**. It symbolizes the designer who is involved in the process by applying design praxis with her/his designerly ways of thinking and doing. The designer takes several roles and apply diverse sets of skills based on the capabilities. The variables, the roles and skills emerged, may expand across alternative cases.
- **Problem**. It is the type of problem (i.e., designing for the BoP) that the product development team/designer needs to work on. The contribution of the designer, the roles and skills may vary depending on the characteristics of the problem context.
- **Contribution.** It symbolizes the impact of the designer's involvement in the process. In the observed case, it is organizational learning.

This model can be read from top to bottom. The method, new product development process phases, are on top of this model and the variables, the designer's emergent roles and mindsets/skills, are underneath, showing that they emerge in the context of the method followed.

The problem (design for the BoP) and contribution fields are separate entities. The contribution field includes the approaches from organizational learning theory (Brix, 2017).

This model places the method, i.e., new product development phases, at the center. The designer, through the course of the new product development process for African BoP communities, takes several roles. The experiential learning skills, the phases, challenges and opportunities of NPD and collaborations impact these emergent roles. It includes the following dimensions:

- ***The Roles of the Designer***. The designer takes roles depending on the interactions within the problem context. Experiential learning is the ultimate reason for the emergence of the roles s/he is able to take. In the observed case, the roles were:
    - User researcher,
    - Frame creator,
    - Collaboration mediator,
    - Creative facilitator,
    - Evaluator, and
    - Inspirer.
- ***The Mindsets and Skills Applied by the Designer***. The set of mindsets and skills applied within the problem context. In the observed case, they were:
    - Holistic thinking,
    - Human-centeredness,
    - Collaborative mentality,
    - Tenacity,
    - Systems thinking, and
    - Change-driven mentality.

The model presents the variables, the designer's roles, with respect to the phases where they contribute most significantly. Indeed, the roles advance in parallel to the requirements of different cases and NPD phases. For instance, *frame creator* role is an effort to simplify complexity with visual representations of systemic connections. It first emerges during the *scouting* phase of food preservation case (Case 1), however, the team also benefits from the resulting frameworks during *strategy development* for cooking case (Case 2) and management trainee collaboration (Case 3). Moreover, frame creator role incorporates most of the mindsets/skills including holistic thinking, human-centeredness, tenacity, systems thinking, and change-driven mentality across different cases. Therefore, one should note that the roles may take place across different phases of NPD.

As shown in the bottom-left part of the model, NPD is accompanied with collaborations in order to establish a long-term value chain. The organization benefits from social embeddedness of the designer during collaborations. Social embeddedness (Badry, 2009) and communication leverage trust (Price et al., 2018) among the partners, ensuring a sustainable value chain.

Moreover, the contribution field, at the bottom-center part of the model, shows the designer's contribution at an organizational level. Based on the data of this dissertation, it is organizational learning (Brix, 2017). It represents knowledge creation, accumulation, and transfer for an emerging practice. For clarity of the relationships, the examples from data are provided as follows:

- ***Forming the resources on contemporary demand.*** In the observed case, the (local) product development department expanded the team with relevant human resources. The department employed me in favor of design background and T-shaped skills. I was the first PhD student in design in the department.
- ***Forming the emergent practice with the knowledge generated via designerly ways of thinking and doing***. I created knowledge with experiential learning skills; carried out field research in order to build knowledge with a human-centered focus.

- ***Transmission of the designerly ways of thinking and doing to the team members through the roles the designer takes, and the mindsets and skills the designer benefits from***. Along with the designer's practice, the roles began to pass onto the team members. In the observed case, not only the designer but also the project leader began to facilitate workshops.
- ***Transmission of the team's knowledge through the interactions of the team members with entire organization.*** The project leader also became a design thinking expert who applied design thinking methodology across the workshops of other departments. This way knowledge transmission was made possible.
- ***Shared knowledge impacts the organizational learning and decision making.*** The organization opened UX lab and design thinking facilities, hired UX and design thinking experts, and African employees. Moreover, project handover between UX-driven development team and agile team facilitated organizational learning.
- ***The learning impacts the way resources are created.*** The organization employed a novice designer (senior design student) to work in the upcoming BoP project.
- ***Resources of the company help to adapt/evolve, ultimately aimed at survival***. The company benefits from contemporary approaches, such as design thinking and human-centered design, at an organizational level.

9.3. Implications of the Model

The discourse of the fields of design, new product development (NPD), and bottom of the pyramid (BoP) have been in transformation (See 4.6. Conclusions to the Literature Review). Meanwhile, designers, with their ways of thinking and doing, impact the way transformation happens (Brown and Wyatt, 2010; Borja de Mozota, 2010, 2011; Diehl and Christiaans, 2015; Muratovski, 2015; Kramer et al., 2016; Na et al., 2017; Price et al., 2018).

Being at the intersection of the three transforming fields, this dissertation provides a perspective on the contribution of the designer to the emerging BoP product

development practice of the multinational company. The findings of this research are in line with the view that design is able to create impact at multiple layers of an organization (Borja de Mozota, 2010; Muratovski, 2015, Na et al., 2017). Correspondingly, the outcoming model implies that the contribution of the designer happens at a wider organizational level.

The model shows that the roles and mindsets/skills ultimately contribute to organizational learning. This is a learning process, in which the roles, mindsets, and skills happen to create and spread knowledge for an emerging practice. Starting with the designer's experiential learning praxis for knowledge creation and the team's transmitting knowledge across different settings of organization, the knowledge transfer becomes possible within the entire organization.

To sum up, this model implies that due to experiential learning skills and associated roles and skills, the designer impacts the organization for creating knowledge for an emerging practice with complex characteristics. The creation of knowledge contributes to the organization at a strategic level with the potential of transforming the way business making happens not only for BoP, but also for other complex problems.

9.4. Limitations of the Model

I developed this model by applying grounded theory analysis to the notes I took throughout the NPD. To have this model, I identified the concepts in the written stories of my professional experience, I broke them into incidents with several codes assigned. I began to review the literature and visited the codes for theoretical relevance. I constantly kept theoretical memos in my journals for explaining the relationships with the literature I was able to perceive. Figure 66 shows the steps of theory (model) development.

This procedure was influenced from my daily interactions within the real context, and the way I made meaning of these interactions. As shown in Figure 66, it aimed to explain the occurrences such as phases (top-left), user research actors (top-middle), or stakeholders (bottom-middle). Meanwhile, I examined the

literature from various disciplinary perspectives in order to find the links between occurrences and theoretical explanations (top-right, bottom-left and bottom-right).

This was an effective procedure in order to capture the emerging theory. The model evolved as I iteratively improved for theoretical relevance. I continued coding until I was able to distinguish the core concept, which was *learning*.

The outcoming model aims to explain the role of the designer in the context of the BoP product development of the multinational company. Each dimension can be described with incidents, which makes the model in line with the data (i.e., *fit*) while empowering the *relevance* of the model to the observed process. Moreover, the model clearly provides explanations, on how my understanding was shaped, with elongated discussions in Chapter 7 and 8 (i.e., *workability*).

Nevertheless, one should note that, the model is built on the relationships and interactions between me and the organization. Indeed, it was a dynamic process, in which interactions and actions changed constantly depending on the situation; characteristics of the cases (e.g., NPD vs. collaboration), whom I worked with (e.g, project leader vs. department manager), and my affiliated position (e.g., Germany vs. Turkey), were some of the factors that determined the way I contributed to this process.

Although the model is built on this dynamic context, it is a *modifiable* model, meaning that it is open to modification through the addition of new data. However, the core concept, organizational learning, still explains the contribution of the designer at an organizational level.

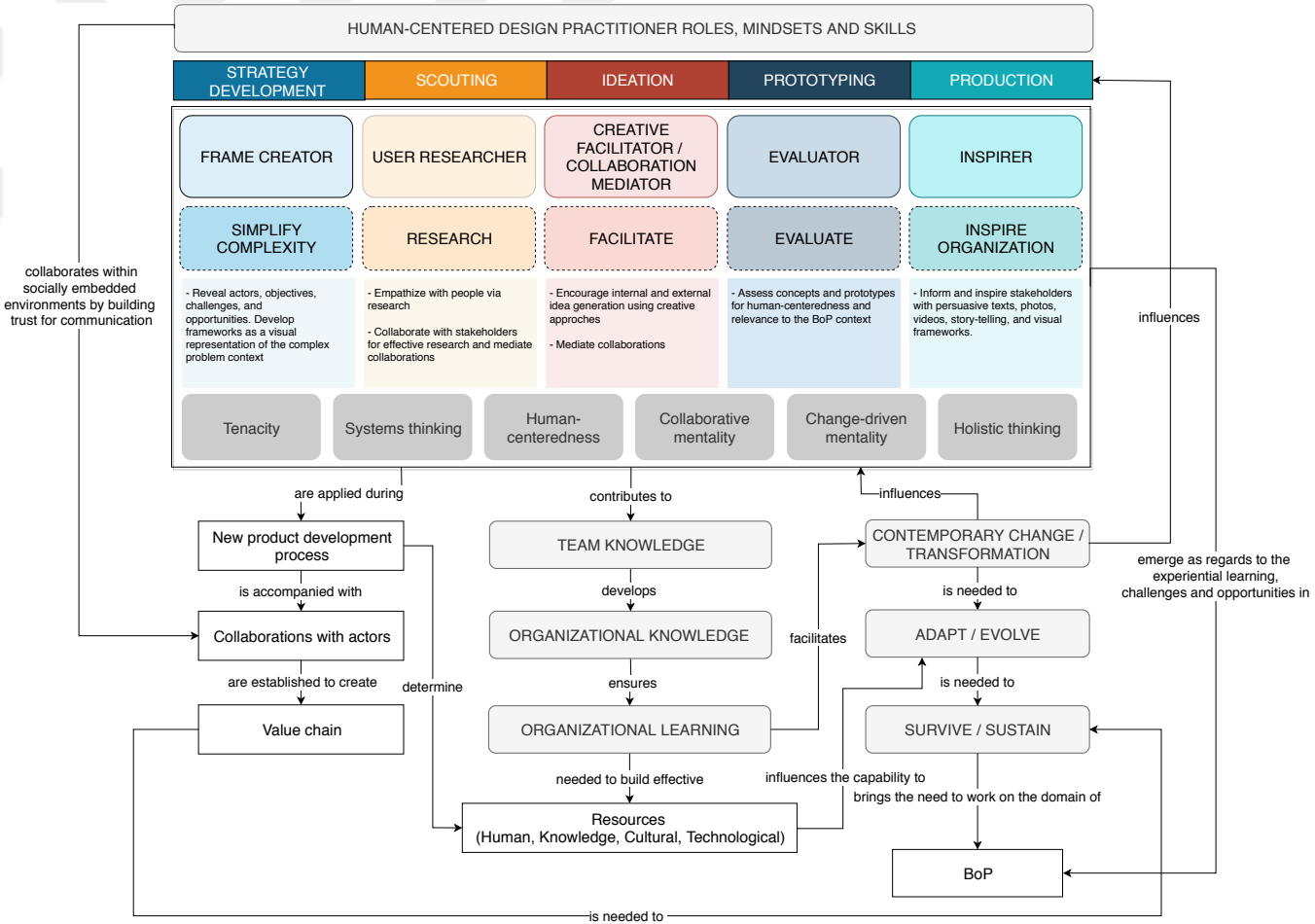


Figure 65. Model of roles based on the research data.

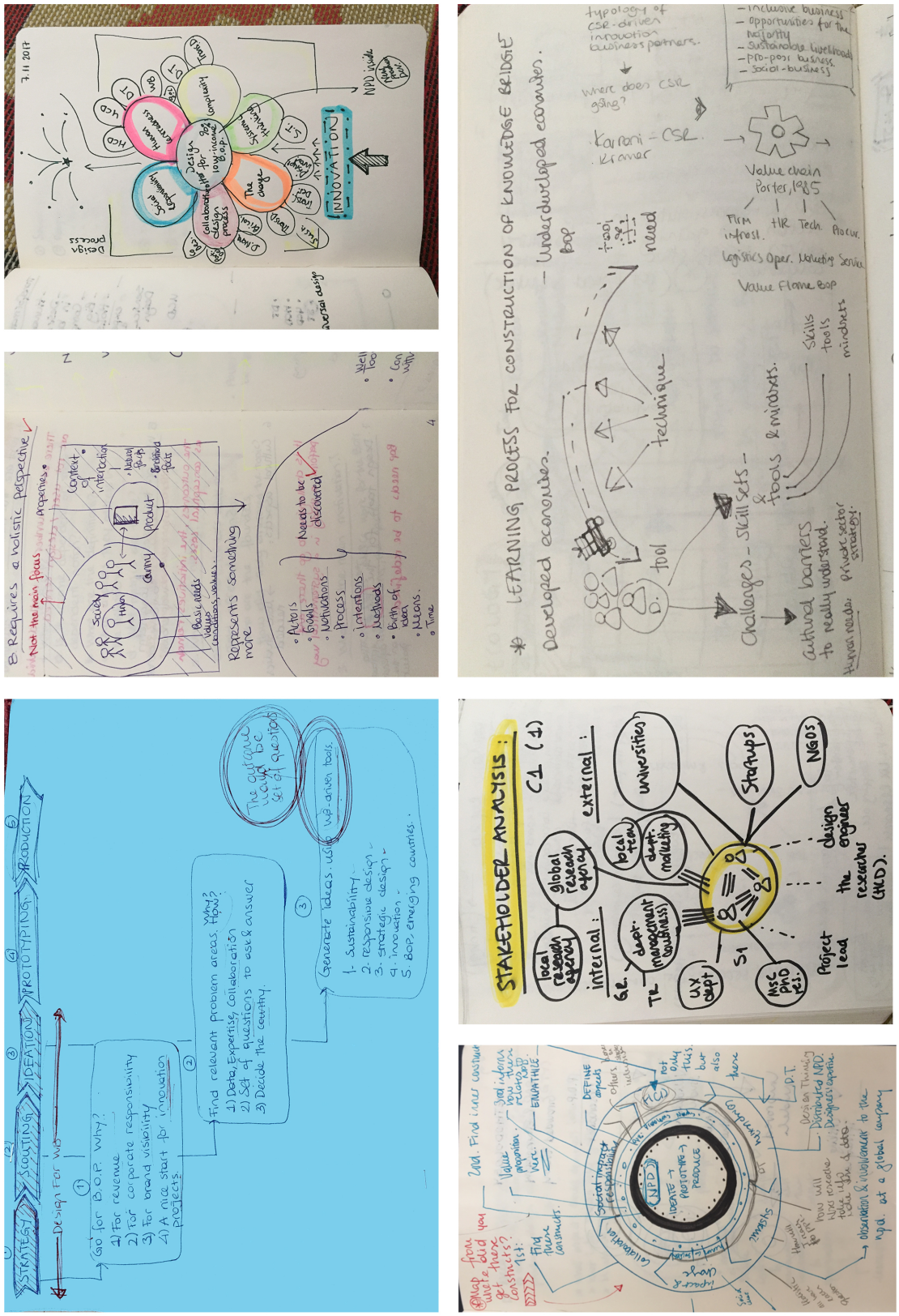


Figure 66. The steps of the model development.

(*Top-left: Journal 3, top-middle: Journal 5, top-right: Journal 6, bottom-left: Journal 7, bottom-middle: Journal 7, bottom-right: Journal 7*).

CHAPTER 10

CONCLUSIONS

Built on a highly personalized account, the purpose of this dissertation is to capture my contemporary design practice by investigating the roles I took and the sets of skills I applied throughout the new product development process targeting the BoP communities. To our knowledge, there is no study carried out to explore the designer roles emerging at the intersection of the design for the BoP and contemporary new product development process of a multinational company. Therefore, the ultimate goal of this research is to create a knowledge source with a unique perspective that allows formation of new understandings about the design practice and deliver a model to inform the audience in a visual way.

The theoretical framework of this dissertation is informed by three literature domains: design, new product development (NPD), and bottom/base of the pyramid (BoP) theories. While the need for changing practices brings these domains together, this framework allows to explain how designers impact organizational transformations.

10.1. Revisiting the Research Questions

As provided in the methodology chapter of this dissertation (Chapter 5), practice-led research forms the foundation of this research. For Muratovski (2016), the research questions of practice-led research need to develop knowledge in the field. In line with this approach, I formulated two major research questions aimed at exploring the context and the roles shaped within this context. Respectively, I aimed to depict the new product development process (NPD) of the multinational company for the bottom/base of the pyramid (BoP) communities, and the roles I took throughout this development. I will explain them in the order of observation:

In search of an answer to ***Q1. How did the new product development process targeting BoP communities take place?,*** I formulated four sub-questions that I explored the research context with *why, what,* and *how* questions.

Q1.1. Why/with which motivations did the new product development for the BoP communities take place?

In an effort to explain my role as a designer within the NPD process, I firstly aimed to observe *why* NPD process for BoP communities were taking place. Staying at a multifaceted discussion concerning the development of an accurate vision for embracing the challenges of BoP, four major motivations of the company were identified as the search for new markets, enhanced reputation and PR, employee retention and training, and capacity for innovation. These four aspects were in line with Del Baldo's (2013) proposition.

Nevertheless, examining myself within the social context provided a wider perspective in explaining the mechanisms. As I immersed in the NPD process, I observed that the motivations were beyond these four aspects. To start with, the stakeholders, in different layers of the product development process, had their own motivations. We all had the objectives and values normally not clearly observable; me as a person who wants to contribute humanity with her designerly practices, the team members wanting to achieve a successful product development process in order to gain power, the department aiming to create human resources effectively by learning and applying contemporary approaches and to build a long-term value chain with stakeholders, the company, aiming to increase its survival potential by adapting to the contemporary world while adding new products successfully to their portfolios, and finally, the BoP communities aiming to move up the social ladder by having pragmatic instruments that would contribute to their families' life quality.

Within this significant project, all of these objectives had to be reconciliated by creating an emerging practice. Myself as a designer, me and my colleagues as part of an innovating product development team, the BoP product development project as a precessor of the forthcoming projects, the company planning to enter the BoP

market and survive in the long term, the stakeholders collaborating for the first time with the company; we were all the *learning entities* of this emergent process.

Q1.2. What approaches, methods, and tools were available during product development?

Under this question, I examine the approaches, methods, and tools as the elements that were not available in my designerly skill set. I embrace the approaches prior to the emerging practice; the ones that I needed to learn to function as a team member. Apparently, it started by gaining familiarity with the company's product development model.

Initially the company's established NPD tradition, product emergence process (PEP), influenced the NPD approach for BoP product development and the methods utilized by the team. The methods, including the trend analysis, market potential analysis, and product analysis, were rooted in the market research tradition. Moreover, formulation of the human resources was depending on this tradition; the members of the interdisciplinary team had diverse engineering backgrounds.

The team, prior to having me, had formulated the NPD process phases starting with ideation, including concept engineering and prototyping, followed by market research, prototyping and tests, and mass manufacturing. Nevertheless, the development approach became open to experimentation as we progressed. I was influential for impacting the decision of NPD methodology towards *UX-driven development*, which was in line with the company's *customer-centeredness* and *continuous improvement mindsets* (BSH Hausgeräte GmbH, 2018b).

Q1.3. How did the new product development process adapt to the BoP product development?

Designing products for the BoP communities demanded alternative perspectives. But mainly, NPD methodology PEP was accompanied with *UX-driven development* and *agile scrums,* carried out by two different teams. Together with *UX-driven development*, the team began to experience the development as five non-linear phases including *strategy development, scouting, ideation, prototyping,*

and *production*. The phases showed iterative characteristics, while several collaborations happened at the background and supported each other for knowledge creation about BoP.

In this duration, *human-centered design* turned into an impactful approach with the positive influence of the field research, aimed at gaining empathy with the unfamiliar others. Then, together with design thinking, these two concepts played a significant role in achieving *learning organization*, empowering the company at a strategic level.

Q1.4. What challenges and opportunities emerged through the course of the BoP product development?

Product development for the BoP communities was a complex process with challenges of their analysis going beyond the scope of this research. Although the rich description in Chapter 6 also provides particular insights on the challenges of BoP product development process, I will stay focused on those that I experienced to be challenging.

Due to the operational challenges making it difficult to observe people in the real context, establishing an understanding about the BoP communities primarily depended on the recognition of the *learning* channels about the BoP communities (Figure 67). These were mostly secondary channels, and several actors were consulted for their opinions, resulting in the creation of holistic knowledge about BoP context.

The secondary research channels provided instantly available data; however, they needed quality and accuracy validation. Besides, the information was multilayered and variant in different levels. For an informed decision-making, I had to synthesize information systematically in connection with each other. Hence, I needed to find *tactics* to overcome the barriers of information access and make meaning of data about the people through taking expert opinions, small-budget research, or ubiquitous technology that allows reaching contextual data.

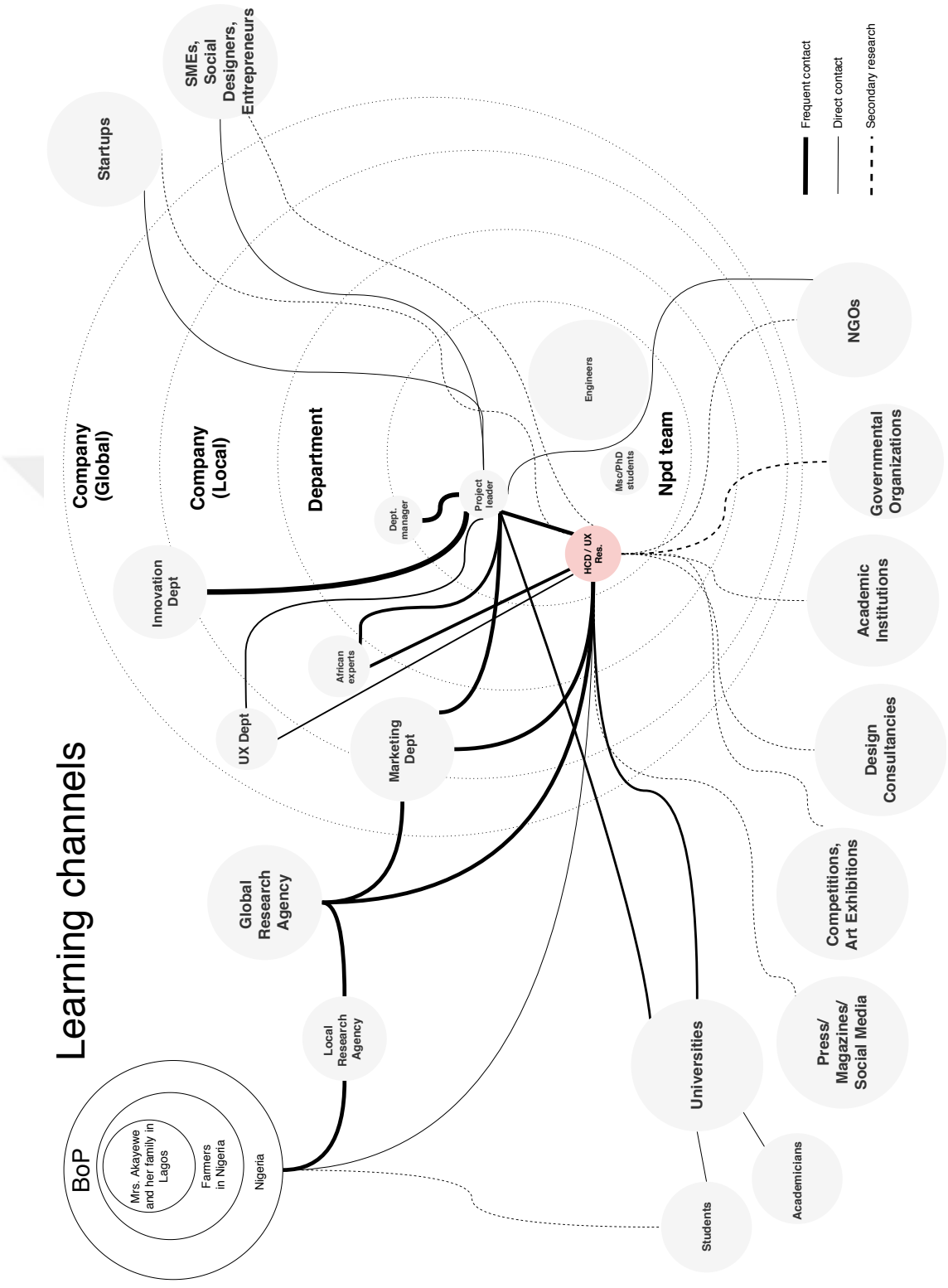


Figure 67. Channels of knowledge creation and learning.

Another significant peculiarity of this process was that learning was happening through collaborations. I empathized with the *objectives* of stakeholders and tried to communicate them effectively through the *mediation* of collaborations (Figure 68). During this collaborative process, I formed a bridge between the stakeholders by formulating and communicating their objectives of stakeholders so that the *value chain* would operate in the long-term.

The interests of multiple parties had to be communicated in order to achieve the best among all options. The reconciliation of all the interests of the stakeholders involved was where the complexity of the product development for the BoP communities was lying. This context would benefit most from human-centeredness (empathy) applied in the mediation of these collaborations.

The first research question and its sub questions helped me to identify the context I contributed. In search of an answer to ***Q2. How did I contribute to the new product development process?***, I formulated four sub-questions that I will answer as follows.

Q2.1. How did my roles and responsibilities take shape?

Although I initially joined the product development team as a UX researcher with T-shaped skills (i.e., with background in multiple disciplines), I made a subtle change into a human-centered designer upon the skills I utilized to learn, think and act on the BoP domain. This was a process benefiting from my *designerly ways of thinking and doing while aiming to incorporate people's needs, technology possibilities, and business requirements* (IDEOU, 2018), making this a human-centered design.

My experiential learning skills were contributing to this complex process by forming the emergent practice with the roles I was able to take. Moreover, I was transmitting my understanding to the entire organization through these roles. With this process, organizational learning was possible.

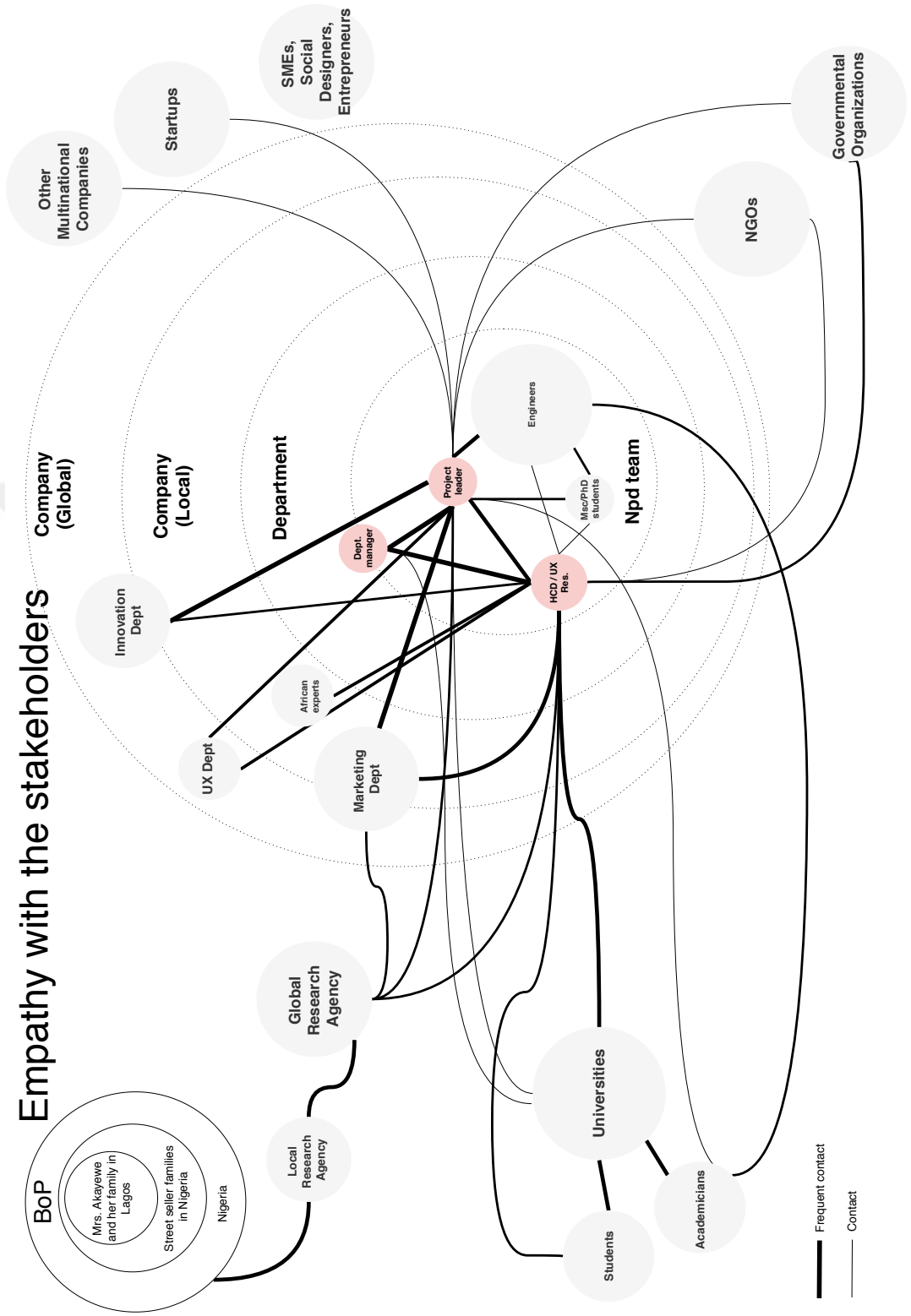


Figure 68. Mediation of the collaborations through gaining empathy with the objectives of the stakeholders.

Q2.2. What roles did the designer take?

The most significant observation was that my roles were taking shape in parallel to the literature discussing that the field of design is experiencing a transition from "design you can see to design you can't see" (Borja de Mozota, 2010, n.d.). The roles mainly emerged around six responsibilities:

- User researcher: I planned user research by considering the characteristics of the people in Africa, the resources (time plan, budget, workforce) of the organization, and the business targets of the product development team and the organization. With user research in Africa, and accompanying research approaches, the team gained confidence and made decisions in an informed way. The perspectives emerged with this practice were transmitted to the entire organization.
- Frame creator: In order to ease the ambiguous, fuzzy front end of the new product development process, I aimed to make abstract ideas, systems, and interactions tangible with visual representations. Frameworks helped to transfer knowledge and made learning possible in a sustainable way.
- Collaboration mediator: I mediated communication between the stakeholders of the product development. In this, my social embeddedness in the collaborated environments and the T-shaped skills leveraged *trust* of collaborators to my practice, which was necessary for the communication of objectives and formation of a long-term value chain.
- Creative facilitator: I took the role of a facilitator both internally and externally in order to boost creativity of stakeholders. This very contemporary practice leveraged the organization's interest into HCD and DT approaches.
- Evaluator: The team and stakeholders needed a reliable assessment method for BoP product concepts given the number of concepts generated internally and externally were numerous. Although some approaches could benefit the formation of the design brief, there was no handy tool for concept assessment. On these grounds, I evaluated concepts due to my familiarity with the product assessment through the university

collaborations and start-up idea acquisitions. Furthermore, I shared my understanding and familiarized the product development team with the perspectives of industrial design, resulting in organizational learning.

- Inspirer: The organizational learning was likely to be leveraged when the knowledge created could be communicated and then transferred to the entire organization. However, the knowledge transfer was possible with a trigger, a motivational method, which inspired internal stakeholders to adopt it. For this purpose, I took an inspirer role, and *informed* the organization with persuasive texts and photos, appealing videos, through story-telling, and via visual frameworks.

These six roles were impactful for the formation of an emerging practice for BoP product development and the transfer of our understanding to the entire organization. I was able to take these roles with the advantage of several mindsets and skills. I will be answering the last two research questions together since they were connected to each other.

Q2.3. What types of resources (skills, methods/tools, research and collaboration channels) did the designer benefit from?

Q2.4. Which of the designer's skills influenced the product development process, and how?

Figure 67 and Figure 68 have provided answers to the learning and collaboration channels of BoP product development, which explains the research and collaboration resources. I have also expanded on the methods, HCD and DT, while answering the sub-questions of the first research question, namely Q1.3 and Q1.4. These were the resources I primarily benefited from. Under these questions, I would like to summarize the major mindsets/skills shaping the roles I was able to take. These were:

- Holistic thinking: Being able to see the big picture and approaching the problem domain from several perspectives while benefiting from T-shaped skills (Borja de Mozota, 2010; Kramer et al., 2016).

- Human-centeredness (Empathy): Being able to empathize with the objectives of each stakeholder involved, clarifying their interests, and facilitating better communication for a sustainable-value chain (Brown and Wyatt, 2009; Borja de Mozota, 2010; IDEO, 2015; Kramer et al., 2016).
- Collaborative mentality: Being able to collaborate with others with a common terminology while benefiting from T-shaped skills (Kramer et al., 2016).
- Tenacity: Being able to diagnose ambiguous aspects and taking actions to manage complexity (IDEO.org, 2015; Kramer et al., 2016).
- Systems thinking: Being able to see the problem space composed of systems, relationships, emotions, experiences, and networks.
- Change-driven mentality: Aiming to create an impactful change for innovation practices (Price et al., 2018).

One should note that the outcoming roles and mindsets/skills emerged as regards to the dynamic interactions within and across different cases. As Press and Cooper (2016) express, the skills of designers will determine the new roles that designers will take. In such an experimental context, I followed my own praxis, the ways of thinking and doing, impacting the emergent practice of the organization.

10.2. Contributions of the Dissertation

This dissertation contributes to the literature with a model incorporating HCD phases, emergent designer roles, and associated mindsets/skills through corporate product development for BoP. To our knowledge, this is the first research carried out at the intersection of designer roles, NPD, and BoP. The model and the findings of this research form a valuable knowledge source for actors aiming to cultivate resources for embracing complex problems such as designing for the BoP.

The significance of the model comes from integrating the strategy development phase to the process of HCD/DT. Different from other HCD/DT models in the literature, this model shows that the designer's involvement in strategy

development may impact the development of resources, which shapes the process and resulting product.

Another significance of the model comes from depicting the designer's wider contributions with the roles and the skills during the formation of emergent practice. In line with the literature, showing that design is going beyond product-centric focus and turning into strategies transforming organizations, the distinction between researcher and designer is dissolving, and emergent designer roles are being shaped based on their ways of thinking and doing concerning the complex problems of the world, this model shows the contribution of designer that happens at an organizational level for the emerging BoP practice.

The outcomes of this research have a number of implications for academia and recruitment specialists. The roles and skills may advance skill development courses as regards to the emergent roles and benefit the recruitment process of corporate organizations. Initially, the model has been found promising to identify the roles and skills for designing for the BoP and adopted for human resource acquisition by the department.

On grounds of these contributions, the outcomes of this study may not only benefit corporate product development teams and business decision-makers, but also BoP researchers, HCD practitioners, and global actors who want to impact the problem area by including design perspectives. Moreover, the stakeholders of the BoP product development, start-ups, social entrepreneurs, and more significantly the academy, aiming to cultivate competencies for the future by considering today's complex problems, may benefit from the outcomes.

Other than these contributions, aiming to fill the gap between practice and theory, this dissertation is significant about the way it reveals rich and in-depth data through narration of the new product development process for the BoP communities. With transparency, it opens data to discussion for delivering further methods, tools, and approaches. The transparency allows knowledge accumulation for the BoP product development. The findings provide a rich description, which is potentially lost while following traditional scientific

methods. Such a contribution is valuable since actors need to know more about the phenomenon to overcome challenges of the practice.

10.3. Limitations and Recommendations for Future Research

During the confidential period (February 2016 - March 2018), upon the request of the project leader and department manager, the names of the external design stakeholders, startups, and research agencies were not shared, and the content of research briefs and user research insights were not included in the narrative. Moreover, the cases were named with respect to their themes, i.e., describing Case 1 as a food preservation case. Furthermore, the project titles, product concept titles, patentable product characteristics, concept designs across different cases, and design engineering steps were not exposed. Therefore, this dissertation does not provide details about the steps of design engineering due to the company's sensitivity. It will be important that future research could investigate the HCD process and roles especially concerning prototyping and production phases of the development process for the BoP.

The findings of this research provide information about the roles that emerged throughout the development process. For future research, it will be also important to explore the effectiveness of emergent designer roles across different phases of the product development process.

Additionally, the findings and the model, showing that organizational learning is present, provides a good starting point for discussion and further research. However, the extent to which organizational learning will be effective was out of the scope of this research. Therefore, it is recommended for further research to examine the utilization of the outcomes by the organization in the long-term.

Finally, future research could continue to explore authentic design experiences across alternative contexts and among designers with diverse skill sets. This may extend the explanations on the transformation of the design profession, skill development for design education, and specialized designer roles within corporate organizations.

10.4. Self-Reflections

According to Le Roux (2017), other than a *contribution* to practice by teaching, informing and inspiring, rigorous autoethnographic research should revive the experience of the researcher. This experience needs to be in search of a self-understanding, which is *subjective* and by evidencing *credibility*. Meanwhile, it should leverage the *resonance* by building an intellectual and emotional bond with the world of the researcher and show the researcher's degree of awareness through critical *self-reflection*. With this purpose, in this section, I aim to reflect on the research process.

The confidentiality of the product development project was a real pressure putting me in doubt whether I was exposing any confidential aspect. I paid attention not to share any information about the product technology or its mechanism and kept the names of the project team members hidden. By keeping the department manager updated while taking their opinions about the progress (See 5.5.2. Ethical Considerations), I aimed to ensure ethical, credible, and confirmable data and outcomes. I focused on creating knowledge only through *my own experiences* as opposed to reporting company information that has the potential to be confidential.

My research focusing on the emergent practice within the course of knowledge accumulation, rather than reporting on the established know-how of the company made it possible to persuade the organization about my Ph.D. research. Moreover, this project was not a typical design project; it was rather a unique and authentic case concerning project characteristics and distributed workstyle. Furthermore, I was not a typical designer either, having diverse backgrounds and being a Ph.D. student at that time.

Autoethnography provided a means to look at the practice from inside the researcher's viewpoint (Pitard, 2017). Respectively, this study shaped on an inward perspective; the transition of the company's new product development process for the BoP was not external to my availability, it was indeed a reality shaped reciprocally, also depending on the way I learned about the topic,

systematized information to make meaning out of complexity, distributed my understanding to the entire organization, and impacted the organization around the interactions by applying my professional skills and system of values.

Trained in the positivist tradition of research in which internal and external validity, reliability and objectivity are the core principles (Burns, 2000) and the position of the researcher is external to the researched phenomenon, I was fascinated by autoethnography method giving me the space to embrace my personal experience within the limits of academic research. The autoethnographic account was empowering my voice as a researcher (Hitchcock and Hughes, 1995). Moreover, it was offering a chance to reach "a greater self-understanding and insight into the social world with the aim of providing alternative ways of doing research that allow for creativity, emotive expression and high levels of self-reflexivity" (Le Roux, 2017, p. 202), which was empowering me as a creative.

Nevertheless, I was aware that this type of inquiry would be treated as non-academic; all the criticism towards autoethnographic research would apply to my research and I would have issues in publishing the results. Moreover, initially, some people considered this was one of the easiest enquiries one could follow. Indeed, oftentimes, due to the strong presence of myself in the narration, I felt vulnerable with the feelings of self-doubt, mostly suspecting whether I seemed egocentric for concluding that the roles I took, the skills I applied, and the values I conveyed were the reasons of an organization's learning and human-centered transformation.

One should mention the impact of my personality on the interpretation of the outcomes. Characterizing myself as a person, who is willing to see positive aspects of life rather than negatives, I might have paid attention to positive occurrences. Yet, being an optimist has been identified among the mindsets of the human-centered designer, which forms a tradeoff when the human-centered designer is a researcher of her own design practice.

Nonetheless, I paid attention to staying analytical and having defensible research qualities. I utilized the approach by Anderson (2006), who argues that autoethnographic inquiry can be carried out with analytical reflexivity.

I had no difficulty in remembering and relating the events with each other in a systematic way. The evidence was available to support my memory; the journals, work logs, digital files, and e-mails constituted the very basis for triangulation. I kept track of the tasks I was involved in, numbered them according to the order of happening, and associated them with the cases they happened. I saved all the e-mails, documents, and my artefacts, and indexed them.

As a Ph.D. student, who is knowledgeable about taking field notes earlier, I began to take notes in my journals from the first day to the last day at work as regards to my observation and interactions with my colleagues. Open coding started in parallel to note taking from the first day and onwards. The coding continued axially aiming to relate the concepts with the literature as I was informed by the research available. Selective coding continued until I identified the core concept as *organizational learning*, then I began to write the theory.

Identification of the core concepts was a dynamic process with an evolving understanding. As I immersed in the research context, through weeks, months, at the end of two-and-half years of observation, and even beyond, the change was not only in my perspective but also in the way I told it, made meaning out of it, and analyzed it. The iterative process of data collection and analysis improved my viewpoint. The more I probed my experiences, the more I realized wider level relationships. Moreover, I should also note that there was a significant incident that advanced my understanding; I changed jobs, and this change, despite being across different tracks of industry and academy, had implications on the way I made meaning of the data. Teaching basic design studio allowed me to see *experiential learning* as the fundamental strength in embracing complex problems, extending my understanding further.

Finally, building trust with my designer praxis was a crucial aspect to work comfortably within this unique product development case. Through immersion and onwards, I gained the trust of the team incrementally with operational design and research activities (Na et al., 2017). However, other than trust, one should also mention the impact of the team members' attitude towards my practice. Similar to the literature indicating that an organization requires a *design champion*

who is willing to take risks that make it possible to impact an organization with design thinking at a corporate level (Chakrabarti, 1974; Na et al., 2017), in my case, primarily, the project leader played the role of design champion by persuading management on the contribution of design/er about larger benefits, and by sharing our stories of success that were convincing to adopt design in different levels of the organization. Moreover, this role was sustained by the department manager, who supported me to distribute my designerly ways of thinking, learning, and doing across different layers of the organization.

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APPENDICES

A. Competencies for Human-Centered Design (Kramer et al., 2016)

Type	Skill	Description
Mindset	**Abstract thinking**	The inclination to identify shared attributes between objects or facts and generalize to a larger pattern or goal
Mindset	**Adaptivity**	The practice of adjusting and modifying to changing environments and conditions
Mindset	**Analogical mapping**	The habit of taking inspiration from seemingly unrelated concepts and apply them to the context at hand
Mindset	**Business savvy**	The acute perception of the business workings of a situation
Mindset	**Collaborative mentality**	The practice of regularly communicating and sharing responsibilities with others and building off their work in order to achieve a shared goal
Mindset	**Concrete thinking**	The inclination to focus on details and attributes associated with execution or usage without generalizing
Mindset	**Convergent thinking**	The tendency to bring in many sources of information in order to arrive at a consensus and to proceed forward with a decision
Mindset	**Creativity**	The consistent ability to find, create, and build new things
Mindset	**Curiosity**	The desire to explore, investigate, and remain inquisitive
Mindset	**Detailed thinking**	The inclination to explore and express the small and fundamental details of an idea
Mindset	**Divergent thinking**	The tendency to constantly seek new information, to maintain a spontaneous and free-flowing mentality
Mindset	**Empathy**	The capacity and the practice to understand others' thoughts, feelings, and experiences
Mindset	**Futures thinking**	The practice of systematically thinking through all possible cases that may occur in the future
Mindset	**Holistic thinking**	The regular tendency to think of and maintain a vision of the "big picture"
Mindset	**Humility**	The tendency to maintain a modest view of one's own importance or capability
Mindset	**Initiative**	The inclination to know when action is needed and to take such action
Mindset	**Leadership**	The inclination to successfully organize a group of individuals into a productive team
Mindset	**Open- mindedness**	The willingness to consider others' ideas and feedback
Mindset	**Organization**	The habit of arranging and keeping track of ideas and objects in a logical and accessible manner
Mindset	**Quick thinking**	The tendency to act on intuition and "gut" feelings or reactions
Mindset	**Self- awareness**	The maintenance of one's own awareness of their thought processes, biases, and insights
Mindset	**Social savvy**	The acute perception of social situations, allowing one to communicate with the audience in an exciting and accessible way
Mindset	**Spatial awareness**	The inclination to recognize and contextualize elements, usually of an idea, prototype, or design, in space in relation to one another
Mindset	**Tenacity**	The quality of being able to persist and maintain determination in the face of obstacles
Mindset	**Unbiased thinking**	The habit to consciously minimize the influence of preconceived notions
Mindset	**Visual thinking**	The inclination to recognize, understand, and analyze the visual layout and aesthetics of objects, whether 2D or 3D
Mindset	**Willingness to fail**	The established habit of suspending the need for success and holding the fearlessness of fail failure
Specialized disciplinary skills	**Accounting**	The practice of preparing and examining accurate financial records
Specialized disciplinary skills	**Acting**	The technique of using words and gestures to tell a story and evoke a reaction from an audience
Specialized disciplinary skills	**CAD**	The use of computer technology to create representations of physical objects or designs
Specialized disciplinary skills	**Data analytics**	The ability to use mathematical and statistical techniques to explore, interpret, and analyze a set of quantitative data
Specialized disciplinary skills	**Engineering analysis**	The ability to analyze the technical engineering details of a problem, an idea, or a potential solution
Specialized disciplinary skills	**Filmmaking**	The ability to stage, shoot, edit, and produce a film in order to share a story
Specialized disciplinary skills	**Graphic design**	The ability to commit ideas and designs to paper or file via photography, Photoshop, Illustrator, and similar tools
Specialized disciplinary skills	**Laser-cutting**	The ability to design for and operate with a laser-cutting machine
Specialized disciplinary skills	**Manufacturing process design**	The ability to understand, conceive of, and create a process for manufacturing a product
Specialized disciplinary skills	**Photography**	The ability to capture photographs of meaningful situations or people, therefore sharing through visual communication

A. (cont'd)

Specialized disciplinary skills	**Project management**	The ability to guide a team to initiate, plan, and execute a design challenge
Basic skills	**Abductive reasoning**	The ability to draw the best possible explanation from a set of observations
Basic skills	**Active listening**	The ability to listen by fully engaging and using all senses to listen and respond in a conversation
Basic skills	**Clarifying**	The ability and habit of asking pointed questions and re-stating what has been already heard in order to confirm understanding
Basic skills	**Critiquing**	The ability to give balanced and useful feedback on others' work in order to promote improvement
Basic skills	**Decision making**	The ability to employ a systematic and unbiased process to first understand the potential choices and then to choose which choice is best for the given context
Basic skills	**Deductive reasoning**	The ability to draw a specific and guaranteed conclusion from a set of premises, which are assumed to be true
Basic skills	**Defining the problem**	The ability to clearly define and recognize the boundaries of the problem being addressed
Basic skills	**Delegation**	The ability to assign and distribute tasks in a project to others in order to maximize effectiveness and efficiency
Basic skills	**Digging deep**	The ability to push beyond the obvious and therefore uncover core insights
Basic skills	**Drawing**	The ability to commit ideas and designs to paper or file by drawing them out, ideally with strong fundamentals in perspective, proportions, and so on
Basic skills	**Explaining in simple terms**	The ability to break down a complex topic and explain it to the average person on the street, in a company, or someone without a high-level understanding of the field
Basic skills	**Facilitating**	The ability to facilitate a conversation between multiple parties and guide the conversation so as to keep it on task and topic
Basic skills	**Goal setting**	The ability to clearly articulate specific and realistic aims for what is to be achieved in a process or project
Basic skills	**Identifying core components**	The ability to uncover the central aspects or subcomponents of a problem or concept
Basic skills	**Identifying key insights**	The ability to pull out the most useful revelations from research
Basic skills	**Identifying known and unknown**	The ability to objectively analyze what is currently known and not known about a specific issue or situation
Basic skills	**Identifying obstacles**	The ability to foresee and address potential problems that might impede project progress
Basic skills	**Identifying patterns**	The ability to recognize clusters or commonalities in data or ideas, and extrapolate these commonalities more broadly
Basic skills	**Improvising**	The ability to react quickly and without other information to a scenario with whatever is available on hand
Basic skills	**Inductive reasoning**	The ability to take a specific observation and apply it in a more general context, drawing a likely but not guaranteed conclusion
Basic skills	**Mentoring**	The ability to support others in growing and learning by providing guidance and advice
Basic skills	**Observing**	The ability to pay attention and notice insights from a set of actions
Basic skills	**Pivoting**	The ability to continually try out new ideas and move in new directions based on an understanding of present and future trends
Basic skills	**Persuading**	The ability to coax someone towards a certain desired outcome or decision
Basic skills	**Prioritizing**	The ability to create and manage a list of tasks, in order of their priority level
Basic skills	**Record- keeping**	The ability to create and maintain thorough documentation and records of all thoughts, communications, or iterations, among others
Basic skills	**Reframing**	The ability to consider a problem or situation from multiple unique perspectives
Basic skills	**Representing ideas visually**	The ability to transcribe and represent ideas in physical form that is not limited to drawing
Basic skills	**Story building**	The ability to build a compelling story and set of characters to represent the problem or idea at hand
Basic skills	**Story telling**	The ability to tell a story about the problem or idea at hand that engages and motivates the audience
Basic skills	**Synthesizing information**	The ability to take all the information that was gathered from observation and/or listening and formulating coherent ideas, conclusions, and inferences from that information
Basic skills	**Trust building**	The ability to create a supportive environment by communicating openly and honestly with team members
Basic skills	**Understanding tradeoffs**	The ability to know how consequences are tied together and how manipulating a circumstance will result in other outcomes
Basic skills	**Working under time pressure**	The ability to produce the desired results of ideation in short time frames that could range from weeks to hours

A. (cont'd)

Contextualized Tasks	**Analyzing strengths and weaknesses**	Objectively analyze a current or future situation or idea for its strengths and weaknesses
Contextualized Tasks	**Assessing viability**	Determine if a design has or will have to capacity to be feasible or sustained
Contextualized Tasks	**Canonical research**	Conduct a comprehensive review of research contained within a project's body of governing rules, principles, and standards
Contextualized Tasks	**Creative use of materials**	Use available materials in a novel or non-conventional way to represent an idea or design
Contextualized Tasks	**Data abstraction**	Take concrete data or observations and transform it into more abstract insights or patterns
Contextualized Tasks	**Idea presentation**	Present and explain an idea or design so that others are able to understand it and provide feedback
Contextualized Tasks	**Ideating under constraints**	Create ideas under specific constraints laid down by the problem or other practical limitations
Contextualized Tasks	**Identifying markets**	Find new or underserved markets to direct efforts toward
Contextualized Tasks	**Interviewing**	Ask thoughtful questions and engage in meaningful conversations in order to understand people's habits, behaviors, beliefs, and other relevant information
Contextualized Tasks	**Layout**	Organize information and interactive elements in a pleasing and useful way
Contextualized Tasks	**Making group decisions**	Lead a working group towards a mutual agreement
Contextualized Tasks	**Navigating online communities**	Follow leads and links on the internet to discover relevant information
Contextualized Tasks	**Need finding**	Discover people's needs—both those they say they have, and those they might not even realize.
Contextualized Tasks	**Noticing what's improvable**	Identify which elements of the current design have the most room for improvement so as to focus on those when ideating
Contextualized Tasks	**Qualitative data collection**	Collect qualitative data useful in further research or analysis
Contextualized Tasks	**Quantitative data collection**	Collect numerical or quantitative data useful in further research or analysis
Contextualized Tasks	**Recruiting and following up with people**	Find and keep in touch with a set of people necessary in the design process
Contextualized Tasks	**Report writing**	Compile a summary that communicates relevant design activities to stakeholders
Contextualized Tasks	**Resource allocation**	Redirect and allocate limited time and resources in the most effective manner
Contextualized Tasks	**Seeking alternative perspectives**	Intentionally look for diverse perspectives to provide feedback on a design or idea
Contextualized Tasks	**Selling**	Find the appropriate outlet for a given design and to persuade a stakeholder to buy into the design
Contextualized Tasks	**Stakeholder identification**	Identify which individuals and groups (the design team, users, the client, etc.) are most essential to the project at hand and ideate accordingly
Contextualized Tasks	**Survey design**	Create an unbiased, comprehensive, and understandable survey tool
Contextualized Tasks	**Synthesizing multiple ideas**	Take multiple ideas from different sources and synthesize them using the best elements of each original idea
Contextualized Tasks	**Touchpoint identification**	Identify all parts of the product or service that the user interacts with or that interact with each other
Contextualized Tasks	**Understanding historical trends**	Understand the trends that occur over a period of time
Contextualized Tasks	**Use case identification**	Recognize the product or service in many varied potential use scenarios
Contextualized Tasks	**Visualizing data**	Translate raw data into understandable images
Contextualized Tasks	**Writing for the public**	Write summaries and communicate meaningfully with external parties

B. The Millennium Development Goals

Goals, targets and indicators

GOALS AND TARGETS FROM THE MILLENNIUM DECLARATION	INDICATORS FOR MONITORING PROGRESS
GOAL 1: ERADICATE EXTREME POVERTY AND HUNGER	
TARGET 1: Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day	1. Proportion of population below $1 (PPP) per day[a] 1A. Poverty headcount ratio (percentage of population below the national poverty line) 2. Poverty gap ratio [incidence x depth of poverty] 3. Share of poorest quintile in national consumption
TARGET 2: Halve, between 1990 and 2015, the proportion of people who suffer from hunger	4. Prevalence of underweight children under 5 years of age 5. Proportion of population below minimum level of dietary energy consumption
GOAL 2: ACHIEVE UNIVERSAL PRIMARY EDUCATION	
TARGET 3: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling	6. Net enrolment ratio in primary education 7. Proportion of pupils starting grade 1 who reach grade 5[b] 8. Literacy rate of 15–24 year-olds
GOAL 3: PROMOTE GENDER EQUALITY AND EMPOWER WOMEN	
TARGET 4: Eliminate gender disparity in primary and secondary education, preferably by 2005, and in all levels of education no later than 2015	9. Ratio of girls to boys in primary, secondary and tertiary education 10. Ratio of literate women to men, 15–24 years old 11. Share of women in wage employment in the non-agricultural sector 12. Proportion of seats held by women in national parliament
GOAL 4: REDUCE CHILD MORTALITY	
TARGET 5: Reduce by two thirds, between 1990 and 2015, the under-five mortality rate	13. Under-five mortality rate 14. Infant mortality rate 15. Proportion of 1 year-old children immunized against measles
GOAL 5: IMPROVE MATERNAL HEALTH	
TARGET 6: Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio	16. Maternal mortality ratio 17. Proportion of births attended by skilled health personnel
GOAL 6: COMBAT HIV/AIDS, MALARIA AND OTHER DISEASES	
TARGET 7: Have halted by 2015 and begun to reverse the spread of HIV/AIDS	18. HIV prevalence among pregnant women aged 15–24 years 19. Condom use rate of the contraceptive prevalence rate[c] 19A. Condom use at last high-risk sex 19B. Percentage of population aged 15-24 years with comprehensive correct knowledge of HIV/AIDS[d] 19C. Contraceptive prevalence rate 20. Ratio of school attendance of orphans to school attendance of non-orphans aged 10–14years
TARGET 8: Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases	21. Prevalence and death rates associated with malaria 22. Proportion of population in malaria-risk areas using effective malaria prevention and treatment measures[e] 23. Prevalence and death rates associated with tuberculosis 24. Proportion of tuberculosis cases detected and cured under DOTS
GOAL 7: ENSURE ENVIRONMENTAL SUSTAINABILITY	
TARGET 9: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources	25. Proportion of land area covered by forest 26. Ratio of area protected to maintain biological diversity to surface area 27. Energy use (kg oil equivalent) per $1 GDP (PPP) 28. Carbon dioxide emissions per capita and consumption of ozone-depleting CFCs (ODP tons) 29. Proportion of population using solid fuels
TARGET 10: Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation	30. Proportion of population with sustainable access to an improved water source, urban and rural 31. Proportion of population with access to improved sanitation, urban and rural
TARGET 11: By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers	32. Proportion of households with access to secure tenure

B. (cont'd)

GOAL 8: DEVELOP A GLOBAL PARTNERSHIP FOR DEVELOPMENT		Some of the indicators listed below are monitored separately for the least developed countries (LDCs), Africa, landlocked countries and small island developing States.
		Official development assistance
TARGET 12 :	Develop further an open, rule-based, predictable, non-discriminatory trading and financial system Includes a commitment to good governance, development and poverty reduction – both nationally and internationally	33. Net ODA, total and to the least developed countries, as a percentage of OECD/DAC donors' gross national income 34. Proportion of total bilateral, sector-allocable ODA of OECD/DAC donors to basic social services (basic education, primary health care, nutrition, safe water and sanitation) 35. Proportion of bilateral official development assistance of OECD/DAC donors that is untied 36. ODA received in landlocked countries as a proportion of their gross national incomes 37. ODA received in small island developing States as proportion of their gross national incomes
TARGET 13 :	Address the special needs of the least developed countries Includes: tariff and quota free access for the least developed countries' exports; enhanced programme of debt relief for heavily indebted poor countries (HIPC) and cancellation of official bilateral debt; and more generous ODA for countries committed to poverty reduction	
TARGET 14 :	Address the special needs of landlocked countries and small island developing States (through the Programme of Action for the Sustainable Development of Small Island Developing States and the outcome of the twenty-second special session of the General Assembly)	***Market access*** 38. Proportion of total developed country imports (by value and excluding arms) from developing countries and and from the least developed countries, admitted free of duty 39. Average tariffs imposed by developed countries on agricultural products and textiles and clothing from developing countries 40. Agricultural support estimate for OECD countries as a percentage of their gross domestic product 41. Proportion of ODA provided to help build trade capacity
TARGET 15 :	Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term	***Debt sustainability*** 42. Total number of countries that have reached their HIPC decision points and number that have reached their HIPC completion points (cumulative) 43. Debt relief committed under HIPC Initiative 44. Debt service as a percentage of exports of goods and services
TARGET 16 :	In cooperation with developing countries, develop and implement strategies for decent and productive work for youth	45. Unemployment rate of young people aged 15-24 years, each sex and total[f]
TARGET 17 :	In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries	46. Proportion of population with access to affordable essential drugs on a sustainable basis
TARGET 18 :	In cooperation with the private sector, make available the benefits of new technologies, especially information and communications	47. Telephone lines and cellular subscribers per 100 population 48A. Personal computers in use per 100 population and Internet users per 100 population 48B. Internet users per 100 population

THE MILLENNIUM DEVELOPMENT GOALS and targets come from the Millennium Declaration, signed by 189 countries, including 147 heads of State and Government, in September 2000 (http://www.un.org.millennium/declaration/ares552e.htm). The goals and targets are interrelated and should be seen as a whole. They represent a partnership between the developed countries and the developing countries "to create an environment – at the national and global levels alike – which is conducive to development and the elimination of poverty".

C. Sustainable Development Goals

Sustainable Development Goals

Goal 1. End poverty in all its forms everywhere

Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Goal 3. Ensure healthy lives and promote well-being for all at all ages

Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Goal 5. Achieve gender equality and empower all women and girls

Goal 6. Ensure availability and sustainable management of water and sanitation for all

Goal 7 Ensure access to affordable, reliable, sustainable and modern energy for all

Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Goal 10. Reduce inequality within and among countries

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable

Goal 12. Ensure sustainable consumption and production patterns

Goal 13. Take urgent action to combat climate change and its impacts*

Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

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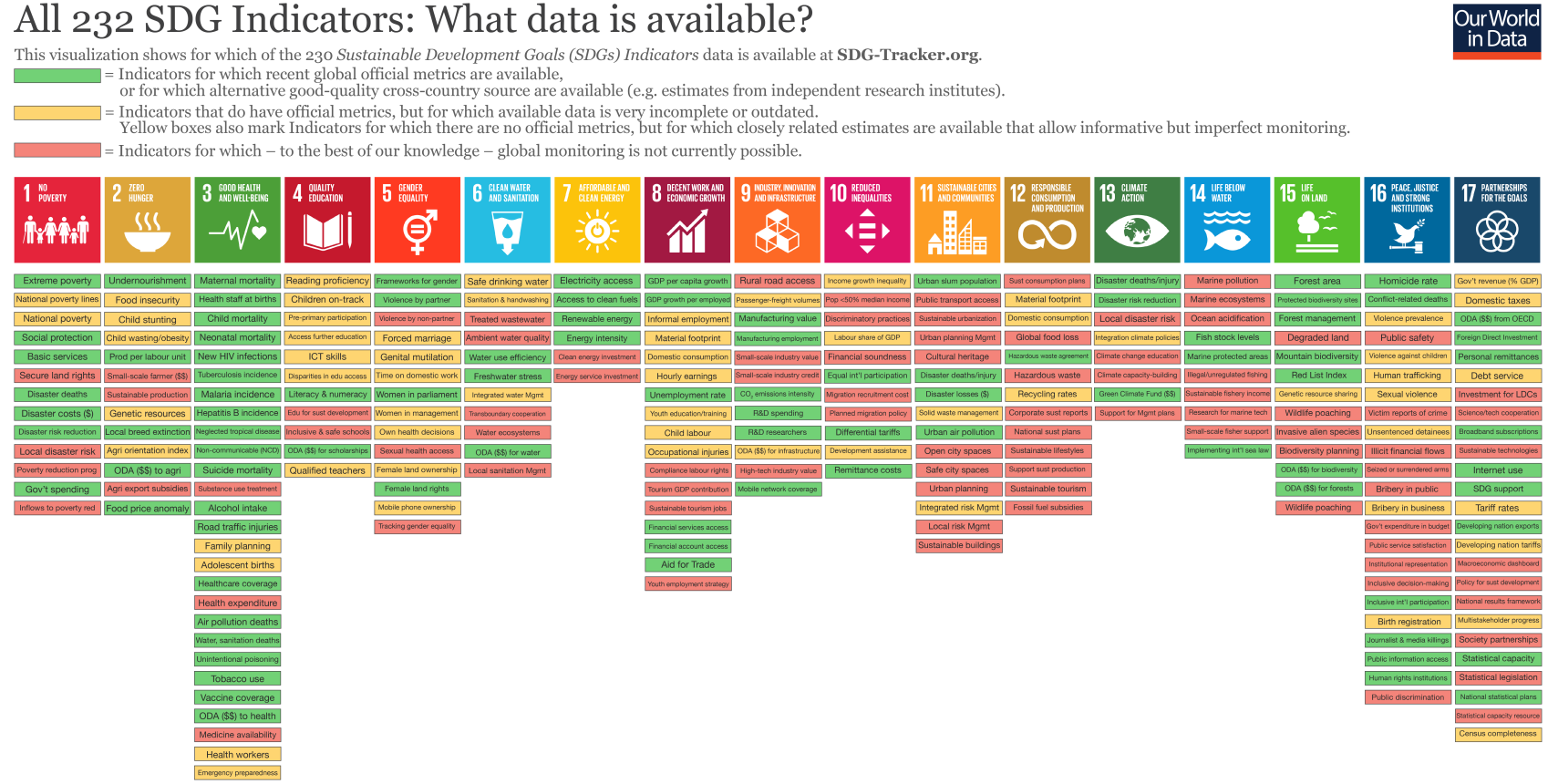
* Acknowledging that the United Nations Framework Convention on Climate Change is the primary international, intergovernmental forum for negotiating the global response to climate change.

D. Sustainable Development Goals (Retrieved from https://ourworldindata.org/uploads/2018/06/SDG-Data-Matrix-01.png)



E. Coded Work Log

Month	Task Definition	Case
February 2016	Reading available trend reports	C1
	The decision of UX research strategy	C1
	Market potential analysis	C1
	NGO search for expert analysis	C1
	Governmental organization search for expert analysis	C1
	Initiating desktop research for Africa	C1
March 2016	Value proposition	C1
	Global agency search and brief for ethnographic study	C1
	Customer segments and market size estimation	C1
April 2016	Agency brief	C1
	Market size research for African Country1 (N) and Country2 (K)	C1
	Market research brief preparation	C1
	FGD collaboration and methodology development with a global research agency	C1
	Delivery of detailed research brief	C1
May 2016	University collaboration planning (ITU)	C4
	Customer segment-based hypothesis formation	C1
	Screener report	C1
	Agency photo document and analysis	C1
	Preparing the observation guide for the field observation	C1
	Nigeria field study and reporting	C1
June 2016	Visual ethnography photo document and analysis	C1
	Product sketching and human-centered ideation	C1
	Research for African Country3 (E)	C1
	Strategy and sketch meeting	C1
	Field research visual documentation	C1
	Game session design for management trainees	C3
July 2016	Startup idea technical feasibility research (P)	C2, C8
	Product concept video making	C1
August 2016	Market potential analysis	C1
	University collaboration planning (METU)	C5
	Brief development for university collaboration	C4, C5
	Design revision	C1
	Speaking with an NGO representative for the BoP needs	C1

E. Coded Work Log (cont'd)		
August 2016	Design agency meeting	C1
September 2016	University collaborations with ITU and METU	C4, C5
	Business model ideation for the BoP projects by management trainee students	C3
October 2016	Strategy meeting	C1
	Expert analysis workshop & semi-structured questions	C5
	Workshop at METU with Nigerian workers	C5
	The preliminary jury at METU Q&A session at ITU with Nigerian workers	C4
	Video making	C1
	Startup for Washing (R&W)	C8
	Design Strategy	C1
November 2016	Field research (usability/UX study) arrangements	C1
	Product concept video for the company innovation day	C1
	The final jury at METU	C5
	Product design workshop with engineers	C1
	Startup idea evaluation based on human-centeredness Literature review for the technical feasibility of the start-up idea Product improvement presentation additions	C8
	Meeting with UX team at Marketing Dept.	C1
	Concept evaluation tool development for university collaboration	C4, C5
December 2016	Final jury at ITU	C4
	Strategy meeting	C1
	User manual	C1
	Strategy meeting and field research (usability) location decision	C1
	Design revisions	C1
	Evaluation of ideas for METU	C5
January 2017	Evaluation of student ideas for ITU	C4
	Second-round market estimation	C1
	Field research (usability) brief	C1
	Revision of field research (usability) format– evaluation of local research firm proposals	C1
	Brief revision in collaboration with marketing department	C1
	Product manual for user study	C1
	Agency search for field research (usability)	C1
	Product part (WB) addition to the usability test	C1
	Screener sheet and evaluation	C1
February 2017	Skype meeting with UX team at Munich	C1
	Product visualization for presentation and research	C1

E. Coded Work Log (cont'd)		
February 2017	Product manual for field research (usability)	C1
	Transcription of videos gathered from distant field research	C1
	Video editing for the education of moderators	C1
	Diary design	C1
	Agency meetings (Skype connection problems)	C1
	Concept evaluation form to apply during field research	C1
	Start of the field research (usability) studies (N)	C1
	Distant field research, visual updates through Whatsapp, videos	C1
March 2017	Start of the field research (usability) studies (K)	C1
	Distant field research, visual updates/videos through Whatsapp, Outlook and www	C1
	Report examination for distant field study (usability) (N)	C1
April-May 2017	Report examination for distant field study (usability) (K)	C1
June 2017	Handover of the project for serial production refinements	C1
August 2017	Design thinking tool design	C2
October 2017	Recruitment evaluation of design students for the BoP product development project	C2
	Brochure text for the BoP university collaborations	C5
	University collaboration meetings for the BoP projects within the organization and with METU	C6, C7
December 2017-January 2018	University collaboration meetings for the BoP projects within the organization and with METU	C6, C7
	Meetings about the confidentiality of collaboration projects and planning of the management of the collaboration process	C6, C7
February 2018	Mentoring the novice designer (HT) about the research framework (based on product development framework with stakeholders and their interests involved)	C2
March-June 2018	Newsletter texts for the announcements of the university projects within the organization	C6, C7
May 2018	Mentoring the novice product designer (HT) for design thinking method to apply in an ideation workshop for the BoP new product development process	C2
February-June 2018	University collaboration – weekly student project mentoring	C6, C7
	University collaboration - framework creation and presentations to internal stakeholders	C6, C7

F. Materials Owned And Developed By The Researcher

Index	File date	Material Information	Tools
1	February-March, 2016	Photos of rural/urban areas in Africa	Google Search
2-3	March 4, 2016 and March 15, 2016	Secondary (desktop) research with quantitative and qualitative data about African countries.	PowerPoint
4	March 4, 2016	Screenshots of specific urban and rural areas	Google Earth
5	March 4, 2016	Product development framework with stakeholders and their interests involved	PowerPoint
6	March 9, 2016	Research brief for visual ethnography	Word
7	March 28, 2016	Research brief and research questions to ask in the field research in collaboration with marketing department	Word
8	April 20-26, 2016	Research about socio-culture, physical context, market segment percentage, estimations and cultural characteristics index (based on Hofstede) for three target countries, in the form of a table.	Google Search Google Academics Excel
9	May 4, 2016	Hypothesis development for customer segment evaluation to be used in the field test	PowerPoint
10	May 11-12, 2016	Field test research methodology, qualitative methods and list of questions to ask during focus group sessions, carried out in collaboration with global research agency	Word
11	May 16, 2016	Visual ethnography brief and initial evaluation of the findings	Word and Excel
12	May 16, 2016	Field trip observation guide	Word and Pdf
13	May 22-30, 2016	75 field photos taken in Lagos-Nigeria and from focus groups	Smart phone
14	June 1, 2016	Human-centered ideation to the business model canvas and value proposition designer	Post-its and canvases by Business.inc Hand-sketches
15	June 6, 2016	Field observation and focus group session report with analysis	Word
16	June 14, 2016	Visual ethnography analysis presentation	Excel
17	June 14, 2016	Comparative visual ethnography analysis	PowerPoint
18	June 20, 2016	Market insight workshop and initial product sketches considering human-centered aspects	Hand sketches
19	July 1, 2016	Field observation video of Nigeria	iMovie, Photos, Google images
20	July 19, 2016	Product concept video	Adobe AfterEffects
21	June 24, 2016	Product sketches for human-centered improvement of product and its parts	Hand Sketches
22	June 28, 2016	Creative session designed for BoP business ideation	PowerPoint KeyNote Creative Facilitation Books
23	August 2, 2016	Market segmentation with respect to customer segments in target 10 countries	Excel

F. Materials Owned And Developed By The Researcher (cont'd)			
24	September 2, 2016	BoP research framework for marketing trainees at Germany (based on product development framework with stakeholders and their interests involved)	PowerPoint
25	September 6, 2016	Ideation workshop in light of market segmentation and reporting	Hand sketching
26	October 3, 2016	Semi-structured expert interview design	Word
27	October 23, 2016	Developing and visualizing a human-centered scenario for an acquired product concept of a startup	PowerPoint
28	November 2016-January 2017	Presentation of field observation during university collaboration- student projects	Critiques, Verbal presentation
29	December 7, 2016; January 9, 2017	University collaboration-student project evaluation (based on Whitehead's dimensions of product design for the low-income communities)	Excel Google Academics
30	December 26, 2016	Product improvements with respect to technical and human-centered aspects – written suggestions	PowerPoint
31	January 9, February 2-January 31, February 2, February 14, February 16	Brief for the usability test, research methodology and aim formulation, in collaboration with the marketing department, global research agency and connected local research agency	Word
32	January 23- February 14, 2017	User manual document	Adobe Illustrator
33	February 20, 2017	Exploded product visualization for presentation	SolidWorks and PowerPoint
34	February 24, 2017	Concept evaluation tool for 25 product concepts acquired by the project team	Adobe Illustrator
35	March 19, 2017	Field photo and data documentation with ubiquitous communication tools	WhatsApp Outlook PowerPoint Keynote
36	March 2017	Field research updates via text and photo	WhatsApp
37	May 30, 2017	Newsletter text	Word
38	November-December 2016, January 2017 and May 2018	Photos from facilitated university collaborations	Smartphone
39	July 6, 2017	Visualization for the BoP context and human interaction	Photoshop
40	August 2, 2017	Human-centered thinking information share in agile sprint	Verbal presentation
41	August 2, 2017	Webpage design support for the projects including the BoP	Wireframe (Paper prototyping)
42	August 16, 2017	Design thinking tool acquisition and development for workshops	Literature
43	October 2, 2017	Recruitment evaluation of design students for the BoP product development project	Skype for Business
44	October 2, 2017	Brochure text for the BoP university collaboration	Word

F. Materials Owned And Developed By The Researcher (cont'd)			
45	February-May 2018	University collaboration – weekly student project mentoring	Critiques, Verbal presentation and evaluation thr. Lync
46	March-June, 2018	Newsletter texts for the announcements of the university projects within the organization	Word
47	February 28, 2018	Mentoring the novice designer (HT) about the research framework (based on product development framework with stakeholders and their interests involved)	Powerpoint Skype for Business
48	May 8, 2018	Mentoring the novice product designer for design thinking method to apply in an ideation workshop for the BoP new product development process	Powerpoint Skype for Business
49	June 7, 2018	University collaboration presentation	PowerPoint

G. Poster Presentation

Tasarımcı ve Araştırmacılar için Uzaktan Gözlem Araçları İncelemesi

Hande Işık
Orta Doğu Teknik Üniversitesi, Endüstri Ürünleri Tasarımı Bölümü

Global düzeyde ürün geliştiren bazı şirketler, gerek sosyal sorumluluk gerekse yeni bir pazar olması bakımından gelişmekte olan ülkelerdeki insanların hayat kalitesini artıracak ürünler tasarlamayı amaçlamaktadırlar. Bu açıdan tasarımcı ve araştırmacılarının, farklı coğrafyalardaki insanların problemlerini, ürün geliştirmeye uygun çalışma sahalarını ve market analizini yapması beklenmektedir. Ancak, ekonomik ve yönetimsel kısıtlar nedeniyle kimi zaman yerinde gözlem yapılamamakta dolayısıyla tasarımcı ve/ya tasarım araştırmacılarının uzaktan bilgi edinmesi ve yorumlaması gerekmektedir. Bu çalışmada, bahsedilen bağlamda yararlanılabilecek yöntemlere yer verilmiş ve tasarım sürecine olası etkileri tartışılmıştır.

Giriş

Ürün geliştirme sürecinin önemli bir kısmı olan araştırma safhasında bilgiye erişim şarttır. Öte yandan, gelişmekte olan ülke ve pazarlara dair bilgi ve bu pazarlar için geliştirilmiş araştırma yöntemleri oldukça kısıtlı durumdadır. Sayısal analiz ve tahminler bulunmakla beraber, endüstri ürünleri tasarımı için elzem olan nitel veriye erişim oldukça zorludur. Bunun için kullanıcıların gözlemi gerekmekte ancak ekonomik ve yönetimsel kısıtlar nedeniyle mümkün olamayabilmektedir.

Yöntem

Bu çalışmada, küresel düzeyde yenilikçi ürün geliştiren bir beyaz eşya firması için Şubat-Mayıs 2016 tarihleri arasında yapılan endüstriyel tasarım araştırması süresince takip edilen araştırma yöntemi ve araçları sunulmaktadır. Araştırmanın amacı uzak coğrafyalardaki olası kullanıcı kesimlerini tespit etmek ve kullanıcıların problem ve ihtiyaçlarını analiz edebilmektir. Bu amaçla önce masa başı araştırma gerçekleştirilmiş, ardından bulguların gerçekliği sahada test edilmiştir. Bu posterde, masa başında gerçekleştirilen araştırma ve yöntemleri sunulmaktadır.

Çalışma Nijerya temel alınarak gerçekleştirilmiş olup iki aşamadan oluşmaktadır. İlk aşamasında ihtiyaç tespiti ve tespit edilen fikirlerin doğrulaması yapılmıştır. Bununla ilgili olarak takip edilmesi planlanan süreç aşağıda verilmiştir:

- Uzman görüşmeleri (Yerlilere/yetkili kişilere erişim)
- Sivil kuruluşlarla görüşmeler
- Girişimcilik fikir ve ürünlerinin analizi
- Resmi ve gayriresmi veritabanlarının analizi

Bu aşamada talep edilen uzman ve sivil kuruluşlarla görüşmeler mümkün olamamış; ancak fikir, ürün, resmi ve gayrıresmi veritabanlarının analizi sonucunda kullanıcıların ihtiyaçlarına yönelik veriler elde edilebilmiştir.

İkinci aşamada ise nitel veri elde etmek amacıyla görsel kanallara (ör.Youtube, Vimeo) ek olarak harita uygulamaları (ör. Google Earth) kullanılmıştır (Şekil 1, Şekil 2). Bu çalışma sonucunda temel olarak üç tip veriye erişilmiştir. Bunlar 1. Ev/yaşam tipleri, 2. Ulaşım yöntemleri ve ağı, 3. Şehir dokusu (gözlemlenebilir insan, mekan, eşya özellikleri) şeklindedir. Bu aşamada elde edilen veriler kullanıcı segmentlerini belirlemede anahtar rol üstlenmiştir.

Şekil 1

Şekil 2

Tartışma ve Sonuç

Günümüz teknolojik araçları, uzaktaki kültürlerin gündelik yaşantısına dair bilgiyi erişilebilir hale getirmektedir. Kültürün çok katmanlı olduğu bir gerçektir. Masa başından yapılan araştırma ile kültürün her katmanına yönelik bilgi almak güç olsa da geliştirilecek ürünün niteliğine göre belli katmanlarına yönelik araştırma yapmak mümkündür. Bu çalışmada yaygın teknolojik araçlarla kültürün fiziksel katmanına erişimin mümkün olabildiği görülmüştür. Araştırmanın ilk safhasında tespit edilen nitel bilginin saha doğrulaması sırasında büyük oranda doğruluk taşıdığı gözlemlenmiş, olası kullanıcı kesimleri doğrulanmıştır. Bundan sonraki çalışmaların, kültürün uzaktan gözlem araçlarıyla erişilebilir katmanlarını ortaya koyması faydalı olacaktır.

ORTA DOĞU TEKNİK ÜNİVERSİTESİ
ENDÜSTRİ ÜRÜNLERİ TASARIMI BÖLÜMÜ

UTAK 2016
2. Ulusal Tasarım Araştırmaları Konferansı

H. Poster Presentation

Kurumsal Şirketlerdeki Endüstriyel Tasarım Faaliyetleri için Bütüncül Yaklaşım Şeması Geliştirilmesi

Hande Işık
Orta Doğu Teknik Üniversitesi, Endüstri Ürünleri Tasarımı Bölümü

Uluslararası ve kurumsal şirketlerin yenilikçi ürün tasarlama faaliyetlerini şekillendiren çok sayıda etken bulunmaktadır. Bu etkenlerin somutlaştırıldığı sistematik bir şemanın bulunmayışı, ürün tasarım sürecini olumsuz etkileyebilir. Tasarım sürecinin başında geliştirilecek bütüncül yaklaşım şemasının; endüstriyel tasarımcı ve/ya araştırmacısının araştırma, tasarım ve üretim sürecini doğru yönetmesi açısından katkısı olacaktır. Böylesine bir aracın karar uzayını görselleştirerek, ürün geliştirme sürecini yönetmeyi kolaylaştırma ve karar vermeyi hızlandırma potansiyeli bulunmaktadır. Bu çalışmayla, kurumsal bir şirketin yenilikçi ürün geliştirme faaliyetleri esnasında geliştirilmiş bütünsel şema ortaya konmakta ve şemanın tasarım karar süreçleri üzerine etkisi tartışılmaktadır.

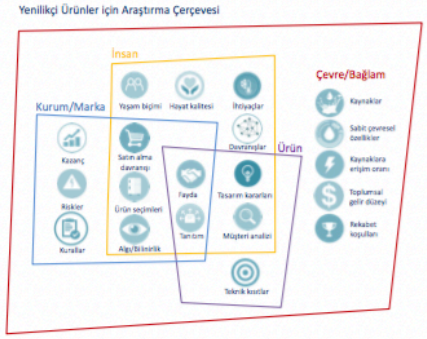
Giriş

Kurumsal şirketlerin ürün geliştirme sürecini ilgilendiren karar ağı oldukça geniştir. Bunda alınan kararların ve paydaşların çokluğu önemli bir rol oynamaktadır. Bu süreçte endüstriyel tasarımı ilgilendiren konuların somut bir biçimde ortaya koyulabilmesi, tasarım için yapılacak araştırma faaliyetlerini sistematik ve hızlı bir hale getirebilecek, bilgi kaybının önüne geçilmesini sağlayacak ve kararların sistematik bir biçimde ele alınmasını kolaylaştıracaktır. Endüstriyel tasarım araştırması, yenilikçi ürün geliştirme faaliyetlerinin önemli bir parçası olsa da yalnızca geliştirilen ürünün kullanılabilirlik araştırması ile sınırlı kalmakta, ürün-insan kesişimindeki çok boyutlu faktörlere ilişkin bilgi geri planda kalmaktadır.

Yöntem

Bu çalışmada, bir global beyaz eşya firmasının, gelişen pazarlara yönelik ürün araştırma-geliştirme süreci içinde yürütülmesi planlanan endüstriyel tasarım araştırmasına kılavuzluk etmesi için oluşturulan şema sunulmaktadır. Araştırma öncesinde yenilikçi ürünün mühendisliği belirli bir aşamaya getirilmiş olup halihazırda geliştirilmiş bir prototip bulunmaktadır. Bu aşamada yapılması planlanan endüstriyel tasarım araştırmasının temelde ürünün ulaşacağı marketi tanımaya yönelik olması beklenmiştir. Ancak tasarım kararlarını çevreleyen kriterlerin çokluğundan ötürü araştırmayı yönlendirecek bütüncül bir yaklaşıma ihtiyaç duyulmuştur. Bu amaçla geliştirilen şemada temel olarak insan, ürün, insanla ürünün etkileştiği çevre ve kurumsal beklentiler temel alınmaktadır (Şekil 1).

Şema, kurumsal şirketlerde yenilikçi ürün geliştirme sürecinde tasarım araştırmasını yönlendirecek temel kriterleri ortaya koymakta ve giderek önemi artan insan odaklı yaklaşımı benimsemektedir. Kriterlerin tespiti, şirket içi dökümanların ve bölüm içinde gerçekleştirilen çalıştayların kavramsal analizi ile yapılmıştır. Buna göre insan, kurum/marka, ürün ve çevre/bağlam başlıkları altında bilgi toplanabilecek 20 kriter bulunmaktadır. Şemanın insan boyutu, ürünün ulaşması planlanan insanlara, topluluğa dair özelliklerini; ürün boyutu ürünle ilgili tasarım kararlarını etkileyen özelliklerini; kurum/marka boyutu şirket düzeyinde ele alınması gereken özelliklerini; çevre/bağlam ise insan ile markalı ürünün buluştuğu koşulların özelliklerini ele almaktadır.



Şekil 1

Tartışma ve Sonuç

Şubat 2016 tarihinde geliştirilen şema, Mart-Mayıs 2016 tarihleri arasında yapılan araştırma faaliyetlerinde uygulanmıştır. Bu şekilde araştırma faaliyetleri sistemli olarak ilerleyerek, ürün kararları verilirken kararın sebepleri ve kararı şekillendiren sürecin takibi kolaylaşmıştır. Geliştirilen şemanın, kurumsal inovasyon departmanında gerçekleştirilecek tasarım araştırmalarında baz alınması kararı verilmiştir. Hem bütüncül bir yaklaşım içermesi hem de mühendislik, pazarlama ve tasarım kollarının birlikte fonksiyonel bir şekilde işleyebilmesi için endüstriyel tasarım araştırmasına konu olabilecek kriterlerin tartışılması adına faydası olmuştur. Benzer şekilde yürütülecek araştırmalarda, şema her yenilikçi ürün geliştirme sürecinin kendine özgü nitelikler taşıması nedeniyle farklı kriterlerle ele alınabilecek, eklenecek kriterler ile zenginleştirilebilecektir.

ORTA DOĞU TEKNİK ÜNİVERSİTESİ
ENDÜSTRİ ÜRÜNLERİ TASARIMI BÖLÜMÜ

UTAK 2016

CURRICULUM VITAE

PERSONAL INFORMATION

Surname, Name: Işık-Tosun, Hande
Nationality: Turkish (TC)
Date and Place of Birth: 13 May 1989, Uşak
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EDUCATION

Degree	Institution	Year of Graduation
Ph.D.	METU, Industrial Design	2020
B.S.	Anadolu University, Sociology	2014
M.Sc.	METU, Industrial Design	2013
B.Sc.	Bilkent University, Industrial Engineering	2011
High School	Çankaya MPAL High School	2007

WORK EXPERIENCE

Year	Place	Enrollment
2018-Present	TOBB ETU University	Instructor
2016-2018	BSH Home Appliances	UX Researcher
2014-2016	BİLTIR/UTEST Usability Labs	UX Researcher

FOREIGN LANGUAGES

English, Italian

PUBLICATIONS AND TALKS

1. Işık-Tosun, H. (2019, July). Learning through industry-university collaboration: Observation of product innovation cases targeting low-income communities. In N. A. G. Z. Börekçi, D. Özgen Koçyıldırım, F. Korkut, & D. Jones (Eds.), *Proceedings DRS Learn X Design 2019: Insider Knowledge* Fifth International Conference for Design Education Researchers, Ankara (pp. 803-814). Ankara: METU Department of Industrial Design.
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HOBBIES

Creative writing, Painting, Photography, Ceramics, Tennis, Argentine Tango