AI in Packaging Design

What implications do Artificial Intelligence tools have on the packaging designer's role in small and medium-sized enterprises?

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1. Executive summary

There is barely an industry left, which is unaffected by the disruptive arrival of AI technologies (Bounfour, 2022). The question remains how those job fields that, from a conventional perspective, greatly rely on human skills and dexterity, will be influenced — such as packaging design where AI has generated equal amounts of excitement and concern (Ma et al., 2009). This thesis has a particular focus on small and medium-sized enterprises (SME) due to their nature of being more exposed to scarcity of resources, which are usually required when implementing AI (Cowling et al., 2015). Therefore, this study will concentrate on the research question of **what implications AI tools have on the packaging designer's role in SMEs.** The study's research design is guided by epistemological principles with an interpretive theoretical perspective following a constructionist, inductive and qualitative mono-method approach. Seven experts within packaging design, design and AI and its implementation within SMEs have participated in six in-depth and semi-structured interviews. Descriptive typologies were applied to examine the data and to abstract the different types of implications, being visualized in a Folk Taxonomy.

Major findings were that packaging design is a field of multiplicity serving differentiation, communication and persuading the consumer. The role of the packaging designer is defined by controlling future-oriented, user-centered and strategy-driven decisions, brand activation, USPs and ESPs. Furthermore, the rise of AI tools is stated as a bottom-up movement, while also discussing technology acceptance, AI vs. human intelligence, the demand for education and the need for content creation firms to apply these tools. These findings strengthened the comprehension of the packaging designer's role with a special focus on SMEs by identifying seven Modes of Implications being caused by the utilization of AI tools. These modes include the strengthening of *Persuasive Visualization (1)*, their *Performance Amplification (2)*, enabling *Toolbox Expansion (3)*, reinforcing *Situational Adaptability (4)*, implying *Specialization Necessity (5)*, introducing *Validation and Risk Mitigation (6)* and encouraging them to *Design Beyond the Status Quo (7)*. The thesis concludes by discussing the theoretical and managerial perspectives and suggestions for future research within the field.

2.Introduction

The emerging technology of Artificial Intelligence (AI) has turned the world upside down and has contributed to a shift in the human way of working, and living, from morning to night, and the way humans exchange and receive information (Tai, 2020). Additionally, fundamental premises in favor of AI are that it has revolutionized several sectors such as the finance, healthcare, life science, oil, gas and energy sectors and has made them into less dangerous, but healthier and more convenient fields to operate in (Bartoletti et al., 2020).

The definition of AI includes the description of the study and the computer's or machine's capability to demonstrate or replicate intelligent human actions (Campesato, 2020). Within the scope of AI, there is the field of machine learning, a segment of AI that, with the help of algorithms and machines, gives computers the skill to receive information and learn from data without getting clear instructions (Zhou, 2021). If it is the ever-growing successful algorithmic trading, algorithms that detect the ideal medication for patients, or the recent invention of deploying AI and machine learning to foresee the spread of the COVID-19 pandemic (Ahmed et al., 2021). These are only a few examples of where AI has brought society forward, creating an ever-changing and transformative milieu for human beings. An insightful examination is why more people engage with the field of AI in recent years, despite the fact that AI has been founded in the mid-20th century (Haenlein & Kaplan, 2019). In fact, the term AI evolved in 1956 by scientists John McCarthy, Marvin Minsky, Nathaniel Rochester and Claude E. Shannon (McCarthy et al., 2006). Nonetheless, the development state of computers at that point encountered multiple challenges in continuously moving forward with the subject of AI caused by not sufficiently strong computing power and information-holding capabilities (Merhi, 2022). As technology has evolved, these limitations have been dealt with by improving the efficiency of computers, advanced processing of a great deal of data and allocating more resources to the production of better algorithms (Dally et al., 2018). While the field has been viewed as an optimistic sphere of advancement and has been responded to with prevalent enthusiasm, it likewise generates an extensive amount of skepticism in some industries and a debate regarding which drawbacks come with the novel technology (Bokor et al., 2022). One of the critics is Andrew Ng, Co-founder and former lead of Google Brain,

who states "[...] the biggest harm that AI is likely to do to individuals in the short term is job displacement, as the amount of work we can automate with AI is vastly larger than before." (Ng, 2016). Ng operates in the software field, there is hardly a job field that remains untouched by the influence of the innovative technology of AI (Bounfour, 2022). It is vital to investigate thoroughly how professions are impacted that from a conventional standpoint largely rest on human skills and dexterity (Felten et al., 2019). One example is the packaging design industry where AI has provoked significant worry among professionals (Ma et al., 2009). The application of these tools leads to a great number of questions, for instance regarding the presence of the packaging design career in the long run and the possible repercussions for experts whose occupation within design is grounded on manual craftsmanship (Cojean et al., 2020).

2.1. Problem Definition

Having undergone a digital transformation in the last 40 years, it is relevant to investigate the creative industry's reaction to AI and see if the state of acceptance towards the emerging technology differs from all the previous milestones that have been made in digitalizing the packaging design process (Siebel, 2019). In order to establish a distinct direction and ensure attainable and relevant conclusions, this study will concentrate on how AI will affect the creative designer's role and employment stability and explore the opportunity of forging a symbiotic work approach between emerging technology and human labor. In fact, AI has entered the industry and is here to stay (Arabnia & Solo, 2019). As it has gathered traction among sectors, the focal area of research has been switching from exploring whether it can have an impact on the profession's roles to its actual implementation (Somogyi, 2021). While there are a few case studies out in the market on how packaging designers in larger corporations have utilized AI in their design process, the ones being employed in SMEs could encounter challenges due to a scarcity of resources (Bhalerao et al., 2022). Therefore, an analysis of their opportunities and challenges is imperative.

Due to the topic's novelty, not a lot of research in the academic field has yet been published that links AI and the design process of packaging. While there exists literature that examines AI regarding packaging optimization and

consumer experience, these tend to highlight the technical production side (Zhang, 2022). To date, there have only a few pieces of literature been published on the impact of AI on artwork such as painting, excluding the business standpoint, or digital design, largely focusing on UI/UX design (Cojean et al., 2020). Nonetheless leaving out the analogue subject of packaging design, which is why this Master's thesis offers a more in-depth investigation of the topic and broadens the existing literature.

2.2. Research Question

Being part of the design industry, many conversations with colleagues evolved around the effect AI will have on their contribution towards future design solutions, expressing a wide spectrum of emotions from enthusiasm to intimidation. Particularly, areas of concern include topics such as whether it will enhance or reduce job opportunities and revolutionize their role of responsibility, fearing being replaced by next-generation technology. A natural extension of this study is to examine the impact of the designer's role within the process, as these would be seen as the traditional source of a unique, original and creative design solution (Chung et al., 2022). This enhances this study's comprehension of the complex interplay of a human-computer relationship and generates valuable data regarding the likelihood of application, the utilization of disruptive technology and how it can generate value. Therefore, this thesis will zoom in on the field of packaging design, which role the packaging designer has, packaging design in the realm of AI and lastly offers a perspective from the SMEs where packaging designers are employed, that aim to embrace these practices, in order to provide managerial implications for this thesis.
Based on the previously mentioned reasoning, this study's goal is to answer the following research question:

What implications do AI tools have on the packaging designer's role in small and medium-sized enterprises?

2.3. Scope and Delimitations

In order to generate relevant and achievable results, it is of high significance to determine the broader parameters and boundaries of this study (Ademuson et

al., 2020). Even though the introduction chapter starts out by describing milestones that have been brought forth by the application of AI on a broader level, this has only been with the motivation to justify the relevance of the topic as it will impact every corner of a business's future environment (Bessen, 2017). Yet, this study narrows down the focus on the sector of packaging design, meaning that any other industry is out of scope, avoiding research implications caused by a too-large of a research area.

Further, another boundary of the study is a geographic factor. Data such as interviews will only be gathered with individuals in the Danish market in the context of packaging design. Clarifying the research area's geographical parameters is essential, as it will be made possible to oversee and identify any geographical factors, such as regulations, politics, culture and society, impacting the study's findings (Abdelnour-Nocera, et al., 2010). Hence, choosing a too-broad geographic region would be detrimental as there is a distinctive point of departure depending on the country when it comes to applying AI, introducing excessive complexity into the study (Ventre, 2020).

Additionally, when establishing the study's scope it is fundamental to designate the level of analysis. There are different types of levels that can be considered in a research project, going from the individual,- the group,- to the organizational level, affecting the selection of methodology for data collection (Crossan et al., 1995). First of all, the research question concerning what implications AI tools have on the packaging designer's role focuses on individual-level parameters, helping to understand the human-computer relationship in the context of a designer and delving into the designer's behavior and attitude throughout the design process. Nevertheless, this study will also tap into organizational behavior, interviewing experts that have experience in implementing AI tools into SMEs. This level of analysis is appropriate considering the variety of implications it can have to implement AI tools in the packaging design process, such as crucial decision-making processes and the company's structure, that potentially could pose a barrier for SMEs (Orser & Riding, 2018). Furthermore, the only processes that will be included in this investigation are the ones that concern the packaging designer's role, meaning that other parts of the value chain in SMEs won't be analyzed. Including both an organizational and

individual level, it can be insightful to see how designers can be supported by the organizations in the packaging design process.

2.4. Outline of the Thesis

As a supporting pillar for the thesis's content and a reader's reference point, the graphic shown below has been created to outline the thesis.

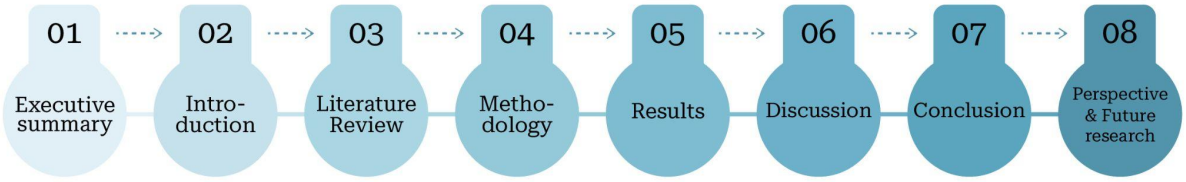

Figure 1: Graphic of the thesis structure

3. Literature Review/Theory

3.1. Small and Medium-Sized Enterprises (SMEs)

Relevance and Definition

A relevant factor to bear in mind when evaluating the feasibility of applying AI in the packaging design process is to center the ability of SMEs to do so. Due to the reason that the implementation of these emerging technologies poses more complex hindrances for SMEs than for large organizations benefiting from a greater extent of resources at their disposal (Ghobakhloo et al., 2022). Assessing the macroeconomic landscape of Denmark, it's particularly noteworthy that 99% of all businesses can be found in this division, totalling around 300,000 establishments on a national level (Olsen, 2021). Additionally, this implies that a large number of creatives working with the expertise of packaging design are employed in SMEs (Olsen, 2021).

Based on secondary research, the European Union formulated a standard definition of the term SME in 1996 (Theile, 1996). Firstly, it needs to employ fewer than 250 individuals, not exceed an annual turnover of more than 40 million euros and lastly, have a balance sheet totalling less than 27 million euros each year. Companies that deviate from these conditions are considered large enterprises (Theile, 1996). Further, more thorough descriptions have been

established, including defining microenterprises as having 0 to nine laborers, small-scale businesses as having 10 to 49 personnel, medium-sized enterprises as having 50 to 249 members and large-scale businesses as having over 249 individuals (Theile, 1996). It is essential to point out that the definition of SMEs differs from region to region with a distinct set of requirements regarding the number of employees, turnover and other financial factors (Carrero et al., 2020).

The origin of small and medium-sized (SMEs) can be found centuries back, though the present understanding of these organizations including their independent and entrepreneurial character has gained momentum in the mid-twentieth century when both European and American policymakers acknowledged its economic impact (Kidalov & Snider, 2011). Driving innovation, contributing towards the development of the labor market and being competitive with large companies, authorities developed regulations and measures to foster the development of SMEs (Bennett, 2014). Turning them into key players from a global perspective according to the World Bank (2023) with 90% of worldwide businesses being small and medium-sized companies, providing for more than 60% of employment and 50% of the gross domestic product.

Opportunities and Challenges

Throughout history, past financial and economic crises have exacerbated challenges for SMEs due to limited financial access (Cowling et al., 2015). Taking into consideration contemporary concerns, the current changes in technology oppose new and further challenges for them. The dawn of the Fourth Industrial Revolution, also called Industry 4.0, presents novel obstacles for SMEs in responding to and familiarizing themselves with the rapidly-evolving technological landscape (Amaral & Peças, 2021). Industry 4.0. portrays the concept of technological progress, industrial advancements and changes in society, for instance within AI, the Internet of Things (IoT) and 3D printing throughout the 21st century (Jia et al., 2019).

These challenges concerning the adoption of emerging technologies can be found in the disadvantages that arise from their smaller size and lack of resources (Gay & Szostak, 2019). Even if decision-making processes may be

quicker to resolve on account of a smaller amount of management levels, SMEs tend to experience challenges in the creation, implementation and execution of a clear long-term strategic plan (Ericson et al., 2016). The lack of clear management levels, where the approval of a project's scope, budget and time periods usually would go through several sign-off rounds, can lead to potential innovation failures (Demirkan, 2018). Simultaneously, SMEs are disposed to having less explicit frameworks in place to avoid and mitigate similar future incidents (Britzelmaier et al., 2021). A further drawback are financial insecurities for SMEs, as they often cannot count on coherent revenue streams or financial backups, making them more exposed when investing in new innovations (Aljawarneh & Ayoubi, 2018). Given SMEs' restricted monetary resources, they are more exposed to situations where they have to employ individuals that do not possess all the needed skills (Demirkan et al., 2021). On the one hand, this enables personal and professional growth, but on the other hand, runs the risk of slowing down business operations due to the absence of experience (Demirkan et al., 2021).

Nonetheless, SMEs possess unique characteristics that differentiate them from ordinary large businesses. Particularly, SMEs possess greater flexibility in their decision-making processes, while major companies tend to have more rigid procedures due to the greater pool of stakeholders (Gupta et al., 2017). Additionally, SMEs have a less hierarchical organizational structure, which allows them to come to a decision more swiftly and have to deal with less bureaucracy (Beamish & Lu, 2001). This also brings SMEs a more efficient communication environment within the departments, giving stakeholders a more overall transparent picture of current operations (Meister & Street, 2004). As opposed to larger enterprises that usually have more complex communication channels (Clarkson & Eckert, 2004). Apart from this, SMEs possess distinct benefits of their smaller company size, building a more intimate team structure where it is less complex to identify the employee's impact of work (Dundon et al., 2007). Thereby, this enables greater team cohesion and encourages employees to follow a clear vision, fostering an innovative, entrepreneurial and risk-taking mindset (Macko & Tyszka, 2009). Ultimately, from a market perspective, SMEs often are able to take on niche markets that are often not part of large enterprises' target markets as a consequence of the

business size and urge to generate large revenue streams (Benson-Rea & Odlin, 2021).

3.2. Artificial Intelligence

Historical background

The article authored by Alan Turing in 1950 serves as a cornerstone contribution in the domain of AI, opening with the question "Can machines think?", which laid the foundation for the development of the first AI program in 1955, called "Logic Theorist" (Turing, 1950). In 1956 the subject's term was coined in the course of a conference at Dartmouth College hosted by McCarthy, Shannon, Minsky and Rochester with the objective to gather several scholars that endow machines with the skill to carry out intelligent tasks and replicate human cognition through programming (McCarthy et al., 1955). Towards the conclusion of the 1950s, experts in the area stated their conviction that AI would be actualized by 1990 (Mitchell, 2021). Nevertheless, a variety of applications, for instance, Machine Translation systems, did not progress as expected, leading to an atmosphere of disbelief. Subsequently, the "AI winter" of the 1970s witnessed a decline in public interest and funding (Yasnitsky, 2020). However, the 1980s expedited growth of the emerging technology, led by events such as Japan's proposal to invest in a new generation of computers, which trend trickled down towards other countries following suit in promoting research in AI (Ventre, 2020). Despite that, towards the end of that decade, the mood shifted, and a term like "AI Winter 2" was introduced, caused of the crash of the AI hardware sector (Delipetrev et al., 2020). As previously witnessed, the progression of AI is not a linear trajectory, which helps to comprehend why it is not surprising that from 2010 and onwards, AI has emerged as a promising era, fueled by Big Data, algorithms and enhanced computing power (Boyd & Elish, 2017). From that period onwards, there have been years of high growth for AI, with essential breakthroughs such as one of the most recent tool that brings AI closer to the visual world is DALL-E-2, a generative text-to-image model (Aaronson et al., 2022). Please find a more in-depth historical background in Appendix 1.

Definition

In the scholarly discourse, there exists a variety of angles on the definition of AI. At the inception of the field, John McCarthy, an esteemed computer scientist and recognized AI pioneer, described AI as "the science and engineering of making intelligent machines" (McCarthy, 2007). Similarly, in the late 1960s, Minsky gave a comparable statement but also highlighted the human element in the machine's activities, saying that such activities "would require intelligence if done by men" (Minsky, 1968). Given the abundance of definitions, navigating these and categorizing them can be a difficult undertaking. Accordingly, in 1995, computer scientists Russel and Norvig attempted to sort AI definitions into two different types: those focused on human factors, which encompass (1) thinking humanely and (2) acting humanely, and those targeting logical functioning, that comprises (3) thinking rationally and (4) acting rationally (Davis et al., 2010). Haugeland defines AI as "the exciting new effort to make computers think like machines with minds, in the full and literal sense" ((01) Thinking humanely) (Haugeland, 1989). However, Rich and Knight stress behavioral actions, explaining that AI is "The study of how to make computers do things which, at the moment, people are better" ((02) Acting humanely) (Knight et al., 2009). Charniak and McDermot's description of AI is determined by "the study of mental faculties through computational models" ((03) Thinking rationally), while Poole relates AI to the design of intelligent agents ((04) Act rationally) (Fetzer, 1990).

Branches of AI: Machine Learning and Deep Learning

Managing the diverse range of terminology when debating the field of AI can be a daunting task, especially as it is often intertwined with Machine and Deep Learning, all in fact distinct terms (Jakhar & Kaur, 2020).

As indicated earlier, AI is involved with the reproduction of human behavior in machines by applying structured knowledge, information and human-like decision-making capabilities, and then making use of training and trouble-shooting skills to accomplish the expected result (Dobrev, 2005). Machine Learning, on the contrary, implicates the development and

implementation of computer systems that can learn and modify their behavior without explicit directives (Ma et al., 2009). Algorithms and statistical models are applied in the procedure to examine patterns in data and draw inferences (Ma et al., 2009). Further, there can be found three different kinds of Machine Learning: Supervised, unsupervised, and reinforcement learning, each of which has its individual demand for input data (Chinnamgari, 2019).

Supervised Machine Learning is controlled by a labeled dataset for training (Chinnamgari, 2019). Applying AI to the visual sphere, a practical example could be a designer using Pinterest for inspiration and using the platform to be exposed to several recommendations based on their previous search keywords. In contrast, unsupervised learning pinpoints hidden data patterns from unlabeled datasets (Chinnamgari, 2019). In the environment of design, a clustering algorithm is able to classify individuals with equal interests and thereby allowing the creation of personas to define a target audience - an essential element of any creative brief (Butterfield, 1999). Reinforcement learning, concluding the three different types of Machine Learning, learns from its interaction with surroundings and compared to the other types does not need any type of data (Chinnamgari, 2019).

Deep Learning algorithms, being driven by the form and operation of the human brain, utilize both structured and unstructured information by applying artificial neural networks, which allow the machines to reach decisions through pattern identification and inference (Chen et al., 2018). The key distinction between Machine- and Deep Learning is the manner in which information is processed by the machine (Ketkar & Moolayil, 2021). Whereas Machine Learning necessitates structured information input, Deep Learning networks function by integrating several levels of artificial neural networks (Ketkar & Moolayil, 2021). An illustrative example of applying Deep Learning in the design sector can be found in the application of object detection in Adobe Photoshop, simplifying image manipulations such as color grading (Rodgers, 2021).

Artificial Intelligence Potential and Future Outlooks

The question of whether AI can meet the human level of intelligence is a major subject of discourse. Examining forecasts from the academic sphere, professor

Sutton expects that realizing human-level AI will be a momentous turning point in science, with a 25% possibility of being accomplished by 2030, a 40% possibility by 2040 and a 10% possibility that it will not be realized at all (Berruti et al., 2020). To thoroughly grasp the scope of this challenge, it is essential to assess the elements that make humans unique. After all, a human's behavior is formed through genetics, the way the individual was brought up and their past experiences (Hunt, 2010).

Whereas, an individual has the skill to cogitate, rationalize, assess and to take part in various extent of cognitive tasks which can be modified to novel situations (Hunt, 2010). Contrarily, AI's objective is to mimic human actions and fulfill assignments that individuals typically would perform (Blankendaal et al., 2021). However, humans depend on their ability to store information, process these and perform cognitive undertakings, AI-controlled applications are in need to handle information in order to work smoothly (Blankendaal et al., 2021). Despite the fact that individuals have the skill to enhance their problem-solving ability, AI is superior in that area due to the fact that it can manage a great amount of data at a more rapid rate (O'Leary, 2013). Though, AI is unable to undertake any cognitive actions, such as cogitating, investigating and troubleshooting based on previous exposure to situations (O'Leary, 2013). Besides, AI makes a choice in reliance on an objective approach as it is rooted in formerly collected information - compared to an individual that can base their decision on subjective reasoning (Adeofe, 1995). Considering that individuals make errors on a day-to-day basis, AI is also exposed to making errors - though tends to have the ability to be more precise on a frequent basis (Dodigovic, 2007). Individuals exhibit an outstanding ability to acclimate to new circumstances and engage in handling several tasks at the same time, while AI applications demand a prolonged period to perform similar capabilities (Stock, 2008). Further, human beings exceed AI-driven applications in their ability to grasp feelings and be aware of their own actions, while AI has yet to exhibit proficiency in that area (Luckin, 2018). Finally, individual ingenuity and originality represent additional disciplines where AI is outperformed by human beings as it is for the current stage unattainable to engage in human-like cognition (Baek et al., 2020).

The social outlook on disruptive technology has reactions from the spectrum of excitement on how it can enrich society's life to severe concerns about the future job market (Granulo et al., 2019). Academic experts state the urgent demand for AI in all sectors and express that the lack of focus on emerging technology will bring severe consequences such as uneconomical and inefficient business operations (Weld et al., 2011).

Nonetheless, there exists a variety of identifiable patterns when focusing on subjects that will lead the future debate on AI. Haenlein and Kaplan (2019) highlight how AI, despite being characterized as objective, can involve biases in its input information that could lead to serious aftermath for the generated results. Further, the authors bring forward the idea to introduce regulations that deal with matters of employment - naming the example to demand companies to allocate monetary resources to enable employees, whose jobs have been affected by technology, to do a career shift (Pavaloiu, 2016). In the years to come, AI-powered tools and methods that do not require much prior usage knowledge, such as DALL-E 2 and MidJourney, will be expanded, bringing the subject closer to the average consumer (Aydın & Karaarslan, 2023). As there exists an underlying argument for all industries being affected by AI, a larger amount of resources will be used to explore how humans can collaborate with novel technology such as AI (Bolton et al., 2018). Other critical topics that demand close scrutiny by authorities will be the black box algorithm, discrimination and misuse, and the creation of fake news and deep fakes which are artificially created false graphics (Rai, 2020).

AI in the Context of Design

Attempting to find relevant literature within the field of packaging design and AI, it becomes apparent that AI has not been closely investigated in the field of going beyond the technical factors of packaging design. Therefore, the research has been broadening up, also considering other design specializations as their processes come closest to the ones of packaging designers. Evaluating relevant literature, the following subjects stood out most: human evaluation, advancement of the designer's role, user's trust, identification of early-stage errors, AI tools providing inspiration and rethinking the essence of work.

Secondary research describes that even though AI has gained the general interest of experts within the field to assist the creative process and develop design solutions, Fisher and Maher (2012) claim that at the end of the production line, there is still a human evaluating its quality and level of creativity. Though, there are also voices within the field that describe that it is actually possible to move the decision-making process over to automated processes powered by AI, not having to deal with capacity or speed restrictions. The authors also acknowledge that AI tools deal with "[...] complexity through very simple tasks, which are iterated continuously." (Iansiti et al., 2020). Additionally, moving the role of the designer, which is built on a more holistic view of problem-solving, into the direction of sensemaking and thereby into leadership, considering which issues need to be addressed or not (Iansiti et al., 2020).

Furthermore, the implementation of AI tools in the early stages is seen as crucial as they help pinpoint early-stage errors and to fine-tune and optimize the final solutions. Besides, it gives the ability to showcase design proposals not in an abstract way, but actually being able to provide illustrative material (Bstieler & Noble, 2023). Another benefit that has been mentioned by scholars is the ability of the collaboration between humans and AI to foster inspiration in the creation phase. Even though it would also provide inspiration to look at competitors' work, AI tools give access to other perspectives - giving the individual the opportunity "[...] to save, compare or elaborate on certain inspirations as well as rejecting them." (Koch, 2017). Likewise, further literature suggests that AI tools do not only provide inspiration but can also help overcome creative block, which describes the designer not being able to make use of their inner creativity (Guzdial et al., 2019).

The authors also mentioned potential drawbacks of AI tools such as risking the implementation of bias, for instance, the application of worn-out trends (Guzdial et al., 2019). In order to obtain the benefits of AI tools, it is also significant to look at the user's ease of application. Literature within the field suggests that the user's trust in this novel technology is strongly linked to the ability of the designer to understand the tools (Zhu et al., 2018). Scholars have also expressed their concerns about the absence of true creativity when applying generative AI tools (Baidoo-Anu & Owusu Ansah, 2023). Another

critical area that has been mentioned is the public's fear of job replacements, one particularly interesting finding of a relevant study within the field was that there is a likelihood of many conventional jobs, also in the sphere of design, will be replaced. The authors call for humans to reconsider the definition of work and create meaningful jobs, which support self-actualization and involve tasks that boost happiness among human beings (Dignum, 2017). Additional research suggests that the field of knowledge work will be disrupted, but also give the professional the capacity to boost their productivity (Dwivedi et al., 2023).

3.3. Packaging Design

Historical background

The evolution of packaging design has been continuously adapted to human beings' needs - starting out in ancient times with functional features such as protection, stashing and being transported from A to B, made out of naturally sourced materials such as animal skins, wood and plants (Petty, 2016). Literature shows that packaging has been functioning as a communication tool throughout its history (Petty, 2016). It was possible to identify the packaging's owner's religion, tribal affiliation and status within the community through the utilization of symbolism (Petty, 2016). In juxtaposition with contemporary times, it is possible to draw parallels when examining the effect of branding nowadays - giving insights into the consumer's preferences, attitudes and behavior (Barber et al., 2010). The era spanning from 3,500 BC to 0 saw the rise of innovative development in the field of packaging such as the craftsmanship of glassblowing and the ability to mass storage items via casks (Human, 2016).

Though, the greatest influence was led by the Industrial Revolution from 1760 to 1840, moving from manual labor closer to machine-produced solutions (Klimchuk & Krasovec, 2013). Several innovations laid the foundation for the implementation of design in the packaging process, such as the British invention of cartons at the outset of the 19th century (Twede, 2012). Other milestones were advancements in printing methods such as the lithographic rotary printing press which enabled a quicker process in the application of a design contrary to traditional printing approaches (Cope & Kalantzis, 2001). Followed by various innovative enhancements throughout the 20th century that

brought the field of packaging design closer to where it is now, for instance, the creation of cellophane, being biodegradable and one of the first types of plastic packaging (Sarath Kumar & Tamang, 2022). Other packaging modernizations were the gable top cartons, consisting of a mixture of 20% plastic and 80% paper, that allowed the storing of liquids - later on laying the foundation for the development of Tetra Pack, a tetrahedron-shaped synthetic-covered material developed by Ruben Rausing (Sharma, 2022). The invention of packaging elicited a direct impact on the market upswing and surge of certain products (Petty, 2016). The rise of products had the consequence of a demand for regulations that protect the consumers, for example, the Fair Packaging and Labeling Act in 1967. It impacted the packaging design in a way that demanded the designer to implement a multitude of mandated information, such as stating the precise substances and details of the manufacturer and distributor (Wesley, 1967).

Prior to the late 1980s, packaging design was driven by manual work involving conventional methods such as drawings, paintings and printmaking (Polat, 2022). Afterwards, the design was positioned on printing plates (Paine & Paine, 1992). With more people owning a computer in the late 1980s, the field moved into a more digital area with an overall focus on developing design software (Sun & Yang, 2016). The 21st century moved the expertise of packaging design into a whole new dimension with the invention of edible material (Edwards et al., 2014). Other trends that can be observed are the growing focus on sustainability regarding recycling and reusability and the application of technological features such as the ability to control the current state of the item, for instance, temperature (Coelho et al., 2020). Reflecting on the several stages that packaging design has undergone, it is noteworthy to observe how it shifted from originating and relying upon human analogue skill sets to entering the digital sphere in the 21st century (Liu, 2022). Overall seen, the field of packaging design faces a promising future outlook in the 21st century, being described as a steadily expanding market in regard to inventive activities due to globalization, the growing demand for recyclable packaging, the shifting of consumer needs and preferences and the rise in e-commerce (Azzi et al., 2012).

Definition

Literature defines packaging design as the scientific discipline of inventing the outer presentation of an item's package that can come in a variety of materials such as canisters, bottles, cartons, jars or paper (Petty, 2016). A common thread throughout prior literature is the distinction between the technical dimension and creative components throughout the packaging design process. First and foremost, factors that drive the technical level are resilience, practicality and safety of the packaged item, while also considering its manufacturing productivity, its fabrication and shipping capacity (Klimchuk & Krasovec, 2013). Another technical perspective on this topic that had a major part in packaging innovation is sustainability which addresses the operations on the assembly line, while simultaneously engaging the packaging designer's creative process (Bertoluci et al., 2011). Consequently, this topic also taps into the creative aspect of packaging design, depending on the brand's strategy, for instance, focusing on sustainability will give the designer directions in regard to the logo design, color, typography, illustration, material and photo style. Inevitably, packaging design serves as a brand touchpoint and an information transmitter with the objective to position itself in the consumer's mind and create a competitive advantage (Klimchuk & Krasovec, 2013).
Further studies have acknowledged several parameters that enrich the dialogue of packaging design nowadays, such as safety (1), ergonomics (2), sustainability (3), logistics (4) and marketing and communication (5) (Azzi et al., 2012). New findings that can be observed in this piece of literature is why packaging design largely is in the interest of brands due to the enormous impact it poses for marketing activities such as visually and verbally communicating the brand's identity, sparking the consumer's interest and being able to influence its decision-making process (Azzi et al., 2012).

Role of the designer

As previously established, the expertise of packaging design has undergone several innovations throughout history that brought the involvement of a creative designer into the spotlight, including but not limited to all inventions regarding the ability to mass produce, long-time store and transport goods that happened during the Industrial Revolution (Petty, 2016). Additionally, the large

influx of individuals moving to big cities, and being employed in the newly established factories, drove the emergence of high-street retailers, moving away from bulk to individual packaging design (Klimchuk & Krasovec, 2013). Combining the craft of graphic design and packaging, originated from the brands' wish to differentiate themselves from competitors, where the design process was mainly drawing upon the creation of logos, which were then placed on the packaging (Klimchuk & Krasovec, 2013). One noteworthy historical example, still having a strong position in the current packaging design market, is the script logo of Coca-Cola created in 1877 (Petty, 2012).

Nowadays, the definition of a packaging designer is the profession of developing practical and aesthetic packaging that both fulfills the requirements of the previously described technical demands, while also implementing visual elements to the design solution (Petty, 2016). These visual elements are applied by the designer with the help of creativity, which is defined by literature, as something unique and original (Jaeger & Runco, 2012). In contemporary times, the packaging designer collaborates with a variety of stakeholders within marketing, manufacturing and legal experts, as designers have become equally responsible to address the right target audience, consider the design's environmental impact and be aware of technical regulations (Rundh, 2009). To pursue the desire to establish a successful career in packaging design, an individual has to obtain comprehensive skills in graphic design, such as understanding among others the rules of grids, colors, typography, illustration and image utilization (Spence, 2016).

In the academic sphere, experts assess the work of a packaging design driven by product-centered design contra user-centered design. Whereas in the conventional field, the professional designers were firstly motivated to meet the good's production requirement and secondly the approach to how consumers interact with the packaging (Bix et al., 2009). Nowadays, there is a much greater focal point on the consumer's needs and preferences (Mohebbi, 2014). Nevertheless, academics within the field advise both utilizing product-centered and user-centered design approaches within the packaging process (Bix et al., 2009). A notable tool is the Lockhart Packaging Matrix which provides the designer with both design and stakeholder facets, which are vantage points to evaluate throughout the process. The authors describe packaging design as a

socioeconomic expertise where the designer has to take protection (1), utility (2) and communication (3) into consideration and that the packaging solution will have to live in the physical (4), exospheric (5) and human (6) environment. The Lockhart Packaging Matrix stands in contrast to the conventional packaging design process, which either is centred towards the user or the product, as it acknowledges a variety of intersections, instead of a one-way approach (Bix et al., 2009).

The Design Development model originally created by Ulrich and others in 2004, has been further developed and split into the following phases: Planning (1), concept design (2), system design (3), specification (4), refinement (5) and production (6) (Eppinger et al., 2019). In the planning phase (1) the designer receives a creative brief with information like the specific audience, objectives, message, overall limitations and practical information such as timing, scope and budget. Secondly, in the concept design phase (2) different design directions are established and tested that are based on the evaluation and prioritization of the product's and stakeholder's needs and preferences. Either the choice is based on the client's selection, by multivoting, by prototyping and testing or by establishing a set of requirements. Moving on to the third phase (3) where the system design is described with its layout, practical features, flow chart and the manufacturing approach. In the specification phase (4) the designer is responsible to create the final design solutions that both require the processing of technical needs such as setting the right color model, crop lines and DPI-setting, but also ensuring that the creative aspects regarding the artwork are in place (Eppinger et al., 2019). The last two phases are the refinement step, including alpha and beta testing, and the production stage, setting the foundation for the product to enter the market (Bix et al., 2009).

Consumer: Decoding of Packaging Design

The objective of brands applying a resourceful process to develop packaging design has the goal to attract the attention of the consumer and persuade them into buying their product (Clement et al., 2013). In order to evaluate which aspects trigger a consumer to do so, it is crucial to assess which influences and situational prospects they are facing (Niosi, 2021). In the academic field, experts state that these can have a direct impact on consumer behavior - being

described as "[...] conduct of someone who enters the store, their selection methods and the moves they make during the course of purchase and post-purchase" (Cherian et al., 2020). The authors declare that consumers' actions are not only driven by spontaneous choices but rather an interplay between interpersonal aspects, cognitive factors and impulses (Cherian et al., 2020).

Consumers are exposed to a large number of products where brands seek to influence the consumer's perception of their brand, though it can cause a variety of emotions for consumers (Lee & Park, 2008). Böckenholt, Chernev and Goodman (2015) find the explanation in the fact that consumers are faced with "choice overload", triggering "buyer's remorse" due to too many choices, either leading to discontentment with the choice that the consumer has made or result in the inability to select a product at all. Further complexity is added when taking into consideration that an individual's decision-making process can be controlled by previous experiences with brands, the extracted knowledge, the consumer's preferences and customer loyalty (Zhung, 2017).

Hence, considering that 70% of buying decisions are done in physical shops, brands consistent usage of design elements such as the logo, color palette, typography, visual form and written material is of high significance due to its recognition value and the ability to lead consumers in a purchasing situation (Franken, 2020). As a brand, there are several factors that need to be taken into consideration when developing packaging design such as the market's culture, user-friendliness, and the environmental-, social and economic impact (Mumani & Stone, 2018). Further, prior research has demonstrated that visual perception plays a crucial role in the consumer's behavior as it supports the brain in identifying parallels of times and thereby benefit the human selection mode (Clement et al., 2013). Suurmets (2018) defines the decision-making process as a tangled synergy between the stimuli response, personal inclinations, information retention and the consumer's mental stamina.

3.4. Frameworks of Technology Acceptance and Adoption

In an effort to evaluate the feasibility of AI in the packaging design process, it is of great value to inspect the company's tolerance to accept and adopt

disruptive technologies. Especially considering that throughout history, whole industries have constantly been challenged to adapt to new circumstances within the technological field and not to become outcompeted (Brougham & Haar, 2020). Though, the implementation of Artificial Intelligence cannot be answered with a simple one-way approach but rather implies the intersection of several factors (Esper & Hasija, 2022). Within the academic field, there are a number of professionals that attempt to provide a framework to understand the user's and the company's situational analysis that can impact its ability to adopt technology which gives insight into which assistance is needed in the implementation process.

Theory of Planned Behavior Model

The Theory of Planned Behavior model has the goal to foresee the user's ambition to involve themselves in particular actions at a designated moment and site (Brougham & Haar, 2020). Further, it elucidates behavior that users can handle themselves by virtue of self-regulation (Ajzen, 2011). The fundamental element of the Theory of Planned Behaviour model is behavioral volition which is affected by the user's perspective on the probability that the behavior will lead to the desired results and its individual estimation of opportunities and possible drawbacks of these results (Ajzen, 2011). Assessing the shown framework in Figure 2, it is noticeable that intention, being the totality of attitude, subjective norms and perceived behavioral control, is a central point when forecasting a human's behavior (De Cannière et al., 2009). Attitude is a human being's personal perspective regarding a particular matter, defined as either favorable or unfavorable, that is formed by the evaluation of one's own actions and the resulting consequences of these (Ajzen, 2020). Whereas subjective norms display external social pressures, such as group dynamics in a cultural setting, directly impacting human behavior (Ajzen, 2020). Lastly, perceived behavioral control considers the degree of complexity that the person experiences when performing an action which is also impacted by the individual's access to expertise and resources (Godin et al., 1993).

A practical example within the field of technology is the study done by George (2004) where the author applied the Theory of Planned Behavior model to provide a comprehensive understanding of individuals' internet purchasing

behavior. The study's outcome implies that participants, feeling a high level of confidence regarding their own abilities and describing the internet as a reliable sphere, were more likely to purchase an item digitally, compared to participants that did not share the same opinions (George, 2004).

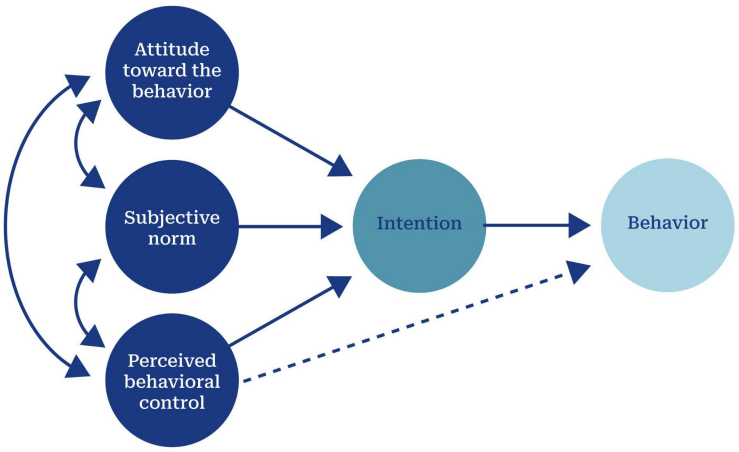

Figure 2. Theory of Planned Behavior model (Based on Ajzen, 1991)

Technology Acceptance Model

The most well-established theory within technology implementation is the Technology Acceptance Model, having the objective to forecast the individual's likelihood of adopting the novel technology by giving insights into possible difficulties that can occur for the individual's future utilization of the system (Kozar et al., 2003).

The behavioral intention is placed in the middle of the model - the way it distinguishes itself is that the factors that shape the intention are more concerned about the individual's opinion about the system's capability. In that connection, the authors describe the perceived usefulness as to what grade the application of the system would improve and benefit the individual's operation. Whereas the term perceived ease of use rather describes the extent of simplicity that the individual experiences when being exploited to the system without making a significant effort (Marangunić & Granić, 2015). Davis (1989) mentions an example, being an appropriate case for the Technology Acceptance Model, that implies the relationship between an elderly human and robots and to what extent the collaboration in a home would increase their quality of life - affecting their perceived usefulness. Additionally, the perceived ease of use would debate

how high the chances are that the elderly person is able to navigate the android. The study showed that the elderly rather accepted the technology in practical tasks than providing social interactions, and both the perceived usefulness and perceived ease of use grew after having seen the actual robot (Beer et al., 2017).

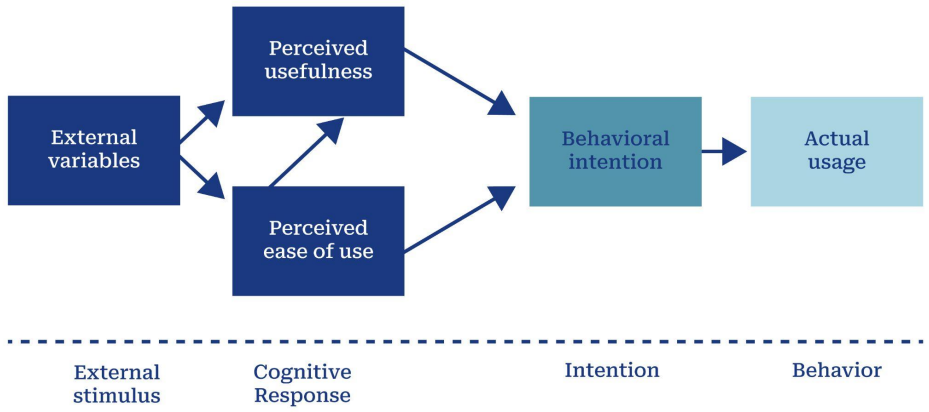

Figure 3. Theory of Technology Acceptance Model (Based on Davis & Venkatesh, 1996)

Technology-Organization-Environment Framework

As some of the early pioneers Fleischer, Tornatzky and Chakrabarti (1990) move the subject of technology adoption from an individual to a firm's perspective, investigating three areas that could be leading the decision for a business to take in a novel technology. As stated by the authors, these decisions need to be investigated under the light of the firm's technological, organizational and environmental context. If a firm has the wish to implement a specific type of technology, it is crucial to consider which pertinent technologies a company already has and which ones can be obtained in the future (Le et al., 2022). In that way, the firm has the chance to receive a comprehensive overview of possible internal limitations regarding its velocity, as the implementation of disruptive technology requires a certain level of expertise (Le et al., 2022). The continuous evaluation of which novel technology exists on the market is of high significance as it can enhance the ability to adapt towards market changes and decrease the risk of being outcompeted (Hakimian et al., 2012). Secondly, the organizational context takes firms' characteristics and resources into consideration, such as their assets, staff, internal communication flow, organizational structure and its level of standardization (Hu & Racherla, 2008). Prior research has shown that encouraging processes that connect diverse departments can lead to ideal circumstances to drive innovation within the firm

(Baker, 2011). The author elaborates “The presence of informal linking agents - such as product champions, boundary spanners, and gatekeepers - is associated with [technology] adoption.” (Baker, 2011). Additional organizational factors that drive technology implementation are the expected monetary resources, current availability of expertise, the support approach within management and the firm’s future prospects (Baker, 2011). To further delve into external factors, the technology adoption is assessed in the light of the environmental context including the industry’s standards, legal requirements set by the authorities, the support infrastructure for innovation and risk evaluation (Lin, 2014).

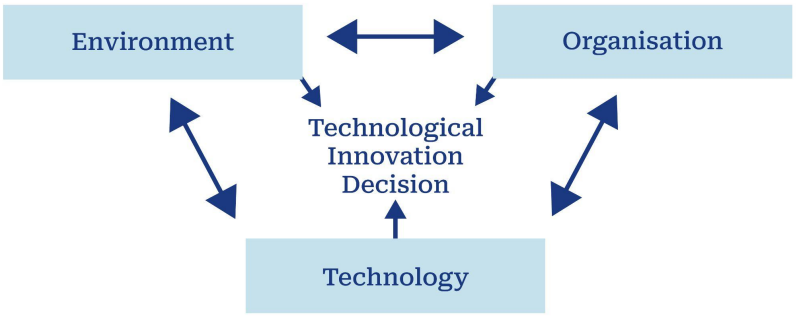

Figure 4. Technology-Organization and Environment framework (Based on Fleischer, Tornatzky and Chakrabarti, 1990)

4. Research Design

The decision-making process of this study has been driven by Saunders (2016) framework, called the research onion. Overall, the framework provides several elements that need to be defined in order to create a coherent and successful contribution toward research. The outermost sheet illustrates philosophical decisions which gradually become more practical and tactical when moving to the inner core (Saunders et al., 2016). There are six layers that need to be examined: (1) research philosophy, (2) research approach, (3) research strategy, (4) choices, (5) time horizon and (6) techniques and procedures (Saunders et al., 2016).

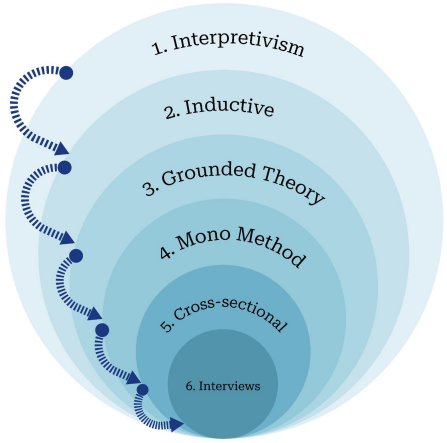

Figure 5: Saunders Research Onion adapted to the research design of this thesis, Source:

4.1. Research Philosophy

The first dimension of research, identified as the research philosophy, functions as the cornerstone of any scientific inquiry, outlining the essential principles and values that drive the specific study (Sahay, 2016). The chosen research philosophy can be grouped under the terms ontology or epistemology. Ontology refers to the notion of reality, whereas epistemology implies the means by which we gain knowledge (Al-Ababneh, 2020). Ontology focuses on the "what" and "how" of individuals' understanding of reality, in essence, it pertains to the scope of human cognition and comprehension (Rawnsley, 1998). While epistemology concerns itself with the process of acquiring knowledge and its constraints (Tuli, 2010). For this particular study, the ontological perspective, being on the spectrum from realism to anti-realism, is not further expanded upon, leaving room for epistemological assumptions. Additionally, professionals in the field such as Michael Crotty argue that it is sufficient for researchers to solely include argumentations from an epistemological standpoint (Crotty, 1998). Though it is crucial to point out that every epistemological postulate will amalgamate with an ontological postulate since the epistemological perspective clarifies how human beings comprehend the universe and the ontological perspective explains the nature of the universe (Meretoja, 2014).

Epistemological standpoints can typically be found in three categories: (1) objectivists, (2) constructivists and (3) subjectivists (Feast & Melles, 2010).

The first category implies objectivists which are individuals who conclude that the reality of a phenomenon occurs without humans' awareness and dependence on their beliefs or personal views, but solely being occupied by finding the truth (Rand, 1967). In the view of an objectivist the point of view and experience with an object does not change the meaning and its fundamental nature. According to them, the statement is shaped by external knowledge and in fact an objective truth (Diesing, 1966). To eliminate the risk of misleading portrayals that negatively affect their studies, these academics endeavor to attempt to avoid individual biases by working around them (Carson, 2005).

Secondly, constructivism believes that individuals develop their personal comprehension of the world (Vrasidas, 2000). Following the idea of social constructivism, aspects such as language, culture and social interactions influence the person's comprehension and over time are shared at a certain level among individuals of a community (Cobern, 1993). That means, sitting in between the objectivist, focusing on external knowledge, and the subjectivist's standpoint, arguing for internal knowledge, constructivists posit that knowledge originates from social interactions between humans and the universe (Mills et al., 2006). As a result, this proposal includes the idea of individuals having a distinctive and opposing comprehension, even when they take part in an identical event (Pouliot, 2007). Scholars need to engage with the study's candidates to expose their understanding of situations that often are not obvious or explicit (MacLeod & Mann, 2015).

The third category consists of subjectivists, having the opinion that human beings' comprehension is a matter of uniqueness and not mutual to others (Endres & Woods, 2007). It stances by neglecting the idea that there solely exists one truth for individuals to reveal (Blackman & Moon, 2014). Hence, based on subjectivist reasoning, knowledge is defined by ambiguity, fragmentation and context dependence, where the interaction between the perceiver and the perceived is an essential part of forming a person's comprehension of the world (Blackman & Moon, 2014). Scholars following a subjectivist view need to point out the diverse viewpoints, acknowledging that the study's participants have their separate sets of singular convictions, principles and personal histories in order to comprehend their approaches to the cases' context (Bunge, 1993).

In essence, this chapter should demonstrate that it is possible to take different standpoints as a researcher when performing a study. It gives the reader an idea of the potential assumptions that have affected the study's outcome. For this thesis, the constructivist perspective will be applied. Arguments for that specific choice lay in the fact that AI implementation is not knowledge that is effortlessly found or obtained, but more accurately put together by human-being through social contexts (Glikson & Woolley, 2020). To be more precise, it is a dynamic field that arises through the correlations between designers and AI methods, both functioning in a wider cultural and social environment (Karaata, 2018). Moreover, as a study that follows a constructivist standpoint, it is noteworthy to mention that all collected pieces of knowledge do not purely consists of an observation of the objective reality, it instead works as a result of the synergy between the researcher, the interviewees and the overall social context (Bahari, 2010). From that perspective, the development of knowledge is inseparable from the researcher (Bahari, 2010). This study constructs its knowledge through the involvement of the study's participants. Firstly, their experience with the subject, engaging with other players in the field and at the same time, the correlations with the researcher (Mohajan & Mohajan, 2022). Further, the social context of these correlations emphasizes epistemology, following a constructivist approach and representing the utilized information for this thesis.

Theoretical Perspective

Having objectivism, constructivism, and subjectivism clarified in the light of epistemological standpoints, it is of high relevance to underline the theoretical perspective as it shapes the research philosophy (Lewis et al., 2012). As a visual example, the theoretical perspective can be described as an optic through which human beings can view subjects, being able to zoom in or distort their sight (Nicolini, 2009). It is a variation of beliefs on how to interpret reality, having a direct influence on the data collection and its outcome. According to existing literature, the most typical theoretical perspectives are positivism and interpretivism (Alharahsheh & Pius, 2020).

Following the perspective of positivism, the researcher thinks that information is present independently of the study's subject (Booth et al., 1996). Involving

any individual thoughts and judgements is not possible, to be more precise, the researcher conducts their work objectively and only takes the position of an observer (Ayeni & Kasimu, 2019). A positivist believes that valid knowledge is collected through the observation of natural events which outcomes acquired through sensory encounters is referred to as empirical proof, showing that positivism is built on empiricism (St. Pierre, 2012). According to the positivist perspective, the gathered data can only be classified as accurate, inaccurate or insignificant (Ryan, 2006). Data which cannot be described as validated or invalidated is disregarded based on positivism (Ryan, 2006). However, interpretivism takes into perspective how the social and cultural environment affects human beings (Ryan, 2018). Whereas positivism solely centers reasoning in the realm of objectivism, interpretivism very much relies on the insights that derive from individuals sharing their opinions and interpretations of events which also sets them apart (Ryan, 2018). Defining the researcher's role in an interpretivism approach, it is vital to mention their active involvement in the study as they have the task to shape an overview and comprehend the individual's behavior, beliefs and interpretations (Ryan, 2018). Comparing interpretivism and positivism, it becomes discernible that the former addresses a humanistic paradigm for unraveling phenomena, whereas positivism advocates for a naturalistic angle (Wilson, 2017). An interpretive researcher looks for correlations within the studied field that nurture their idea of reality (Gerring, 2003). Additionally, on that foundation, they attempt to carry out abstractions at a higher level in order to convert subjective perceptions into objective knowledge (Gerring, 2003).

In this study, the theoretical lens is navigated by epistemological principles with an interpretive theoretical perspective following a constructionist approach. Prior to elucidating a field of subject, comprehension of it is necessary. As the thesis subject evolves around disruptive technology, operating in a dynamic and ever-evolving field, the overall approach is exploratory. When researching the topic, a noteworthy observation was that literature addressing the impact of AI on the packaging designer's role has been challenging to gather due to the lack of research. It is essential to apprehend the individual perspectives of conduct and what factors drive these. A practical example for this study could be to delve into the designer's level of acceptance and usage of AI tools. In that sense, it is not in the position of the researcher to

judge if the answers given by the participants are either accurate, inaccurate or insignificant as the positivist researchers would proceed and therefore positivism is not chosen in this study (Ryan, 2006). The focal area of this investigation is to receive a comprehension of the individual's perspectives, which will be unfolded by interpreting. Nevertheless, it is also vital to mention that the optimal choice depends on the research question, meaning that experts within the field do not see interpretivism superior compared to positivism (Weber, 2004). The author has acknowledged the advantages of applying positivism as a research paradigm such as objectivity, fostering unbiased outcomes that can enhance credibility to research findings (Junjie & Yingxin, 2022). Additionally, it also gives the chance to validate and replicate findings across multiple contexts as it usually is built upon a quantitative data collection (Kankam, 2019). Though, it also carries some disadvantages which are the limited scope as it only addresses events which can be observed and measured objectively (Rahman, 2020). Besides, the implications of AI tools on the packaging designers role is closely related to the individuals behavior that is reversely driven by societal, cultural and historical events, such as the technological advancements within the design field (Hasin et al., 2009). In contrast, positivistic researchers do not consider these events and conduct their studies with an emphasis on isolated factors, not receiving an insight into human conduct (Junjie & Yingxin, 2022). Based on all aforementioned arguments, it can be concluded that an interpretivist research approach would be the most suitable methodology for this study.

In summary of the preceding discussions, it has been explicated that the epistemological premise is rooted in constructionism which constitutes the core of the theoretical perspective, that has been identified as interpretive.

4.2. Methodology: Research Approach

The research approach is an essential element of conducting research, as it constitutes the overall methodological architecture that directs the collection of data and the ensuing analysis of the findings (Thomas, 2014). The author differentiates the research approach between inductive and deductive. Inductive research approaches are described by the development of theories premised on collected empirical data, in contrast to initiating the first research

steps in accordance with pre-existing theories such as the deductive research approach (Soiferman, 2010). Deductive research has the aim to expand upon existing theory or inspect it by establishing and testing hypotheses that evolve from the specific theory (Elstein, 1994).

Within the design sector, a practical example of a deductive approach entails implementing Friis and Mølhave's (2023) research project as the foundation for delving into methods to enhance the mental health of designers both being employed on a freelance and project-based contract. The authors have been making use of an inductive research approach to construct three tools grounded in art and nature that supports practical creative exercises, called "Other Hand", "Power animal" and a slow walk in nature (Friis & Mølhave, 2023). In order to verify this framework, an academic would apply a deductive approach, starting out with testing the hypotheses that have been created by Friis and Mølhave (2023) and collecting data stemming from a new group of individuals to either prove or put forward a replacement framework that explains the phenomenon.

In contrast, the impact of AI on the packaging designer's role has not yet been researched. Hence, this study takes on an inductive research procedure that concerns three distinct phases: Starting out with conducting the observation that AI has become accessible to a greater extent in various fields such as design. Secondly, the researcher collects data to establish an understanding of the contemporary influence that AI has on packaging designers' work and investigate prospective implications by discovering patterns during the data collection phase. The third stage suggests formulating a theoretical framework or a preliminary verdict in light of the found consistencies. However, it is also essential to point out that an inductive approach has its limitations, for instance, the incapacity to generalize the results and the lack of an option to deliver full proof (Hussein et al., 2014). Though, it provides great flexibility throughout the process and ensures that the researcher can conduct its study with close attention to the subject's context (Burke et al., 2017).

4.3. Methodology: Research Strategy

In line with the author's argumentation, the research strategy signifies the manner in which the examiner anticipates proceeding with their investigation

(Saunders et al., 2016). The research strategy works as an integral element of the methodology as it equips the researcher with a well-defined roadmap and a coherent process to continue with their study, bridging the choices and the methods being applied in the data collection phase. Saunders (2016) identifies several strategies that can be applied, such as the experimental approach (1), the action research (2), and the case study (3). the grounded theory (4), ethnography (5) and archival research (6).

The experimental approach (1) is a research method that implies systematically varying one element to see if it affects another element with the goal to examine their correlation (Lorch et al., 2010). Further, it operates with a deductive approach that follows the positivist research philosophy, proposing that knowledge can exclusively be examined objectively and unaffected by external influences (Reyes, 2004). In contrast, action research (2) is defined as a qualitative and user-focused technique, applying hands-on learning in true-to-life situations, developing tools that are improved by on-going feedback (Newman, 2000). The third research methodology is the case study research approach (3), usually being applied in inductive and qualitative studies, which entails a thorough investigation of a singular field of study to receive an extensive comprehension of a tangible problem, being grounded in an interpretive paradigm (Eisenhardt, 1989). The fourth strategy is called grounded theory (4) which comprises the creation of a novel framework or theory based on the collected data, without being provided by prior theories (Bonner et al., 2006). When implementing the grounded theory, an inductive approach and qualitative in nature, the investigator aims to detect any parallels in the data, ideal for conducting research on previously unexplored subjects (Oktay, 2012). Ethnography (5), following an interpretive research philosophy, encompasses studying individuals in their natural habitats to document subjective opinions and relations (Palmer, 2001). Archival research (6) leverages prior-existing documents to collect data through an examination of data, optimal when aiming for a historical angle (Mohr & Ventresca, 2017).

Upon considering the six different research strategies described by Saunders (2016), various aspects make it possible to exclude certain strategies from consideration. Starting out with experimental research (1) that has been viewed as irrelevant considering the prior choice of an inductive approach for this

study. Likewise, experimental research is defined as objective and follows a deductive approach, that is not coherent with the interpretive nature of this thesis. While it is more likely to simulate real-world settings with action research (2), it is not considered fitting for this thesis, as it largely concentrates on hands-on problem-solving skills rather than developing novel theories (Dick, 2007). Despite the fact that case study research (3) has a great basis as it is known to be mostly inductive and pursues an interpretive philosophical approach, the grounded theory (4) seems more appropriate for this study (Diaz Andrade, 2009). Case studies are prone to center around a particular case, while the grounded theory delivers a more wide-ranging perspective of the study's field (Diaz Andrade, 2009). In addition, Saunders approach to ethnographic research (5) has been disregarded given that adhering to this strategy requires a long-term engagement with the studied individuals, exceeding the scope of this thesis (Gusterson, 2008). Ultimately, archival research (6) presents difficulties regarding accessibility and additionally also does not provide contemporary knowledge of the AI's impact on the packaging designer's roles (Mohr & Ventresca, 2017).

The most relevant strategic choice for this study is the grounded theory, in light of its most common application which is to explore a novel research area such as the impact of AI tools on the packaging designer's role. Undertaking an inductive and interpretivist approach, the grounded theory targets to collect the subjective standpoints of individuals, without making use of any pre-existing theories that potentially could constrain the exploration phase (Oktay, 2012). Consequently, this gives the researcher the ability to conduct data that is more comprehensive, allowing the data to make its case and exposing numerous parameters affecting the field of the subject (Oktay, 2012). Furthermore, the grounded theory yields the benefit of providing flexibility and giving room for working iteratively, enabling refinement of the research question along the way, which is especially valuable in light of the continuously evolving advancing nature of the AI sphere (Egan, 2002).

4.4. Methodology: Choices

When clarifying the chosen methodology for the thesis, it is additionally necessary to deliberate upon the most appropriate procedure to gather and

examine data. The British professor Saunders (2016) introduces the terms mono-, mixed- or multi-method, being built upon qualitative and quantitative research methods.

The quantitative research method is applied when a field already has been well-examined and it is possible to build its data collection upon hypotheses and bring statistical analysis into play (Holton & Swanson, 2005). Following this technique, a researcher gathers their information on the basis of a more broadly sampled population and focuses on numerical information, for instance making use of questionnaires that serve to discover patterns and connections among a variety of factors (Sukamolson, 2007). On the flip side, quantitative research methods do not provide the option to explore phenomena which have not been fully investigated before (Balnaves & Caputi, 2001). Qualitative research methods handle a much smaller sample size, often employing procedures such as in-depth interviews, focus groups, observations or ethnography (Boddy, 2016). Qualitative research methods give individuals the ability to develop a stronger bond with their participants, being able to follow up on their reflections, compared to a quantitative study that for instance solely requires filling out a survey (Paley, 2000).

Establishing the definition of qualitative and quantitative research is essential, as these are an integral part of the mono-, mixed- and multi-method. When drawing on mono-method approaches, the scholar exclusively makes use of a singular research method, either being qualitative or quantitative, for acquiring data and its examination (Hassard & Pym, 1990). Particularly, if the study is centered around one extremely concentrated topic, the mono-method is an adequate choice as it delivers extensive access to relevant data in order to understand the research theme fully (Nanthagopan & Vivek, 2021).

Secondly, the mixed method implies the usage of qualitative as well as quantitative methods during one singular academic study. It is ideal when the subject of investigation involves a higher level of complexity and requires a wider range of examination to receive deeper insights (Creswell, 1999). It is crucial to decide upon a structure for how to collect data - either sequential or concurrent (Harrison & Reilly, 2011). Sequential research implies the performance of research relying on a singular method at the beginning of the

data collection phase and then involving the other method at a later point in time (Andrew & Halcomb, 2009). If the researcher decides on pursuing the concurrent procedure, they simultaneously conduct qualitative and quantitative research (Andrew & Halcomb, 2009). Applying both qualitative and quantitative research enables the researcher to gather and examine data in a preset or developing way. In the preset approach, the individual has previously shaped an idea of the data type and the way it should be investigated, whereas the more open approach establishes the technicalities throughout the process (Allen-Meares & Lane, 1990).

The third option is to make use of the multi-method, which entails the execution of two or several other research initiatives to examine research questions. It is important to point out that each study is addressed separately (Collier & Elman, 2008). Both qualitative and quantitative research approaches can be applied and the procedure can follow a preset- or a more developing way (Allen-Meares & Lane, 1990). Though, contrary to the mixed method, the multi-method is tailored towards responding to specific sub-questions (Niehaves, 2005).

Considering the most appropriate choice for this thesis, it is vital to reflect upon the research question and what type of data collection is needed to provide a sufficient response. For this study, a mono-method that employs qualitative research has been identified as the most optimal choice. Due to its large focus on giving space to enter exploratory research, when facing little availability of information on a novel research area such as the impact of AI tools on the packaging designer's role (Nanthagopan & Vivek, 2021). The thesis' research question requires getting close to the packaging designer itself, to deliver a foundational understanding of their role and examine the link between packaging design and AI. It is necessary to discover the affected individual's feelings, position and behavior regarding AI, opening up a strongly subjective field that cannot be acquired through gathering numerical data. Additionally, this study is being executed by a solo researcher, taking the thesis's realistic scope into consideration. Both the mixed- and multi-method requires a large number of resources and by solely focusing on a singular method, the researcher has the ability to center their study around a more concentrated examination following the available time frame (Cerigo & Quesnel-Vallée, 2020).

4.5. Time horizon

Within the framework of Saunder's paper, the author intends to convey that a study can either be conducted in a longitudinal or cross-sectional way (Saunders et al., 2016). Longitudinal research conducts its project over a longer period of time and involves repetitive observations of the identical collection of individuals that imply shifts in the participant's conduct, their viewpoint, a process or a situation (Ployhart & Vandenberg, 2010).

On the other spectrum lies the cross-sectional manner, characterizing a study consisting of a distinctive collection of individuals at a given time frame (Kesmodel, 2018). In a study, the cross-section refers to a subset of a population that expresses the characteristics of a larger demographic (Kesmodel, 2018). A benefit of the cross-sectional study is that it makes it attainable to examine multiple features at the same time (Kraemer et al., 2000). In other words, it delivers a momentary capture of the dynamics happening in a society in a defined time interval, providing the researcher insights into similarities that potentially can help reveal prominent tendencies (Kraemer et al., 2000). Considering the short time frame of the thesis, this study will follow a cross-sectional approach as its execution can happen at a quicker pace compared to longitudinal studies. Additionally, pursuing a cross-sectional procedure allows delving into the recent status of AI and its effect on the packaging designer's role. This is particularly valuable given the current surge of AI software being launched in the design realm.

4.6. Techniques and Procedures

Data Collection

This thesis proceeds with an analysis section that solely relies on primary data, which subsequently works as a further progression in the discourse chapter as the findings can be juxtaposed with previous existing research within the domain. The collection of information through secondary data has been driven by the utilization of CBS's digital library and search engines such as Google

Scholar, that provide scientific literature, for instance, publications, reports and abstracts.

Expert groups

For the purpose of providing a response to the research question, the level of analysis in this thesis is to acquire knowledge from experts within the field. To explore the field of AI and the packaging designer's role from different angles, three expert groups with diverse skill sets have been formulated. The first group is experts in packaging design, providing a picture of packaging design as a discipline, its procedures and the function and duties of a packaging designer, helping to establish a basic understanding of the subject. The second expert group comprises individuals with an intensive knowledge of AI and design. Topics that are being discussed evolve around what works and what does not, and determining opportunities and concerns linked to emerging technology. Further objectives are to shed light on the level of acceptance regarding AI in the field of design and receive reflections on whether AI tools are capable of replacing designers. The choice of prioritizing experts within the design area on a broader level is due to the subject being in its early development. The third expert group contains professionals whose occupation is to implement AI in SMEs, as packaging designers are usually members of a greater business ecosystem. Considering that SMEs represent a substantial portion of the market, the majority of in-house packaging designers are hired by these organizations. Consequently, delving into the topic of AI application from a business standpoint is fundamental, as it offers great insights into the managerial implications and future outlook within the field. Objectives of the third expert group involve receiving answers on how AI can create value for SMEs and the required organizational considerations in relation to its application.

Qualitative method: In-depth, semi-structured interviews

For this thesis, in-depth and semi-structured interviews have been chosen as the most appropriate way to proceed. There are various reasons to select interviews as a qualitative method. Czarniawska (2014) is a prominent scholar who acknowledged the value of implementing interviews in a study. According

to the author, interviews are an exceptional way to receive a significant comprehension of the interviewee's understanding of reality, which is particularly important for this thesis since the selected participants work either in the packaging design realm or have knowledge within the field of AI. First and foremost, interviews can enable the researcher to pose precise questions, which increases the possibility to acquire explicit knowledge (Czarniawska, 2014). Having interviews face-to-face leaves room for follow-up questions, which ensures that both the researcher and the participant perceive the question correctly and provide a coherent response (Rogers, 1976). Overall, it is essential to ask open-ended questions to minimize the risk of biased examinations by leading questions and enabling their respondents to elaborate on their answers (Bernard et al., 2018).

In this thesis, seven experts participated in the interview, which was considered adequate, particularly as information saturation was reached by the final interviews conducted, meaning that any additional interviews are considered to be not delivering any novel data and thereby not bringing value to the study considering the required resource allocation (Bernard et al., 2018). Of the seven experts, four were professionals in the field of packaging design, with two of them also possessing expertise in AI and design. Therefore, these two individuals are also considered to be in the second expert group working with design and AI, consisting of four individuals. Lastly, one individual was interviewed for the third expert group, which explored the application of AI tools in SMEs. Please see Figure 6 for more information.

Overview of interviewees

Name	Job title	Date of interview	Expert area
Nanna Kanneworff	Lecturer and Graphic Designer	24.03.23	Packaging design
Mette Vilsøe Lowth	Lecturer and Brand Strategist	24.03.23	Packaging design
Jonathan Faust	Design Director	29.03.23	Packaging design & AI in the field of design
Anders Jessen	Technical Director	30.03.23	AI in the field of design
Peter Stenbæk	Creative Director	29.03.23	AI in the field of design
Mikael Tonning	Executive Design Director	04.04.23	Packaging design & AI in the field of design
Marie Normann Gadeberg	Senior Data Science Consultant	05.04.23	AI implementation - Focus on SMEs

Figure 6. Overview of interviewees

Two individuals were interviewed as a group at the request of the participants, which is both a productive use of resources regarding time, but also an inspiring contribution due to the individual's interacting with each other, providing

space to elaborate on personal comments (Fontana & Frey, 1991). The remaining six individuals were questioned in individual interviews. While having to fit into one of the three expert groups, the individuals were chosen by snowball sampling, which means that the study's participants have connected the researcher to further experts, being beneficial as it helps to find people with particular attitudes and behavior, such as the usage of AI, is not always shown transparently (Geddes et al., 2019). Convenience sampling, also considered a non-probability sampling technique, is also made use of in this study. Applying this technique, enabled the researcher to make use of their own network and include individuals that were easily within reach considering the researcher's background in design (Stratton, 2021).

As one of the study's scopes involved concentrating on the Danish market, another selection criterion is that all interviewees are located and operate in the Danish market to ensure a focused research project and minimize any cultural distinctions (Martin, 2011). Five out of six interviews were conducted online, also comprising the group interview due to the respondents being placed in distinctive areas of Denmark and having high-paced jobs, implying limited available time. Nonetheless, it is equally important to name some disadvantages that come along with online interviews, for instance, technical difficulties and the restricted ability to be able to read body language, which possibly can have an effect on the quality (Arnell & Thunberg, 2022). The duration of the interviews is between 45 to 65 minutes and was recorded either by phone or through Microsoft Teams. Lastly, all interviews were carried out in English.

An interview guide, shown in Appendix 2, is applied in all six interviews, being conducted in a semi-structured manner, asking open-ended questions. These techniques facilitated the interviewee to communicate their individual opinions in their own unique manner, while also giving the researcher the ability to plan for the interview (Rapley, 2001). The interview guide varied depending on the expert group, as these imply a distinctive set of objectives. The structure of the interviews includes a brief introduction of the study, including its research question, the diverse number of expert groups and its objectives. Other subjects being addressed involve approving consent to state the interviewee's name and consent to record the interview. The second phase entailed background and introduction questions regarding the participants to ensure a welcoming setting

for the interview. The third and fourth segments varied for each expert group. As a last point, the fifth part involved concluding the conversation and allowing the participants to share any remaining questions or feedback.

Data Analysis

The compiled information underwent a two-stage approach. Beginning with the primary stage which implies data formatting and labeling by utilizing codes (Eisenhardt, 1989). Subsequently, the developed codes are ordered into groups via theoretical examination (Eisenhardt, 1989). As previously mentioned in the research approach section, the entire procedure of handling and labeling data follows an inductive approach that builds the foundation to create hypotheses, which allows for the development of theory based on the gathered data. As stated by Eisenhardt (1989) this entails that the labeling technique, topics and formulated frameworks are not shaped by or derived from prior studies.

Step 1: Data Formatting and Labeling with Codes

The AI tool Whisper, a state-of-the-art speech-to-text algorithm, has been utilized for the transcription of the interviews, which can be found in Appendix 7-12. As the interview guide could not be examined with a test participant before utilizing it for the actual interviews, the transcription procedure happened at the same time as information was gathered. In this way, it was possible to adjust or rephrase questions when previous respondents experienced difficulties to answer them, encouraging an iterative data collection approach. Academic literature that directed the first coding round is given by Huberman, Miles and Saldaña (2014) which implies categorizing noteworthy text segments into descriptive labels. The authors call this procedure “descriptive coding”, elaborating on its function to allocate tags that entail a few words that communicate the core message of the selected text (Huberman et al., 2014). Moving on to the second step of labeling the gathered data, which had the objective of discovering similarities and compiling the codes into a more concise set of overarching themes (Huberman et al., 2014). Through reviewing the collection of labels, twelve general themes with 115 codes have been established that incorporated numerous distinct labels. The next stage involved developing a coding tree as it helps to outline the

categorized data visually and indicates the variety of labeling stages (Huberman et al., 2014). Please find the coding sheet and tree in appendixes 5 and 6.

Step 2: Theoretical examination

To ensure that the collected data that is chosen for the analysis section, closely aligns with the research question, a Folk Taxonomy has been implicated in this thesis. A Folk Taxonomy has been described as advantageous for the theoretical examination of the gathered information, as it has the ability to uncover connections and similarities, while also making it easier to construct any analytical abstractions (Huberman et al., 2014). According to secondary research, a Folk Taxonomy refers to a series of words that are organized and clarified in a particular way (Huberman et al., 2014). The descriptive typology by Dumez (2016) is one such abstraction that has been applied to determine various types of impact that AI tools have on the packaging designer's role. To be more precise, descriptive typologies were applied to examine the data and abstract the different types of impact, being visualized in the Folk Taxonomy.

Data Quality

When conducting studies, academic scholars' argumentation of a successful outcome often entails having a high data quality, where conventionally seen validity and reliability are key terms in its evaluation. These principles are vital as validity concerns the precision of research results and its capacity to precisely portray the subject of study, while reliability involves the coherence and persistence of the analytical outcome (Heale & Twycross, 2015).

Following the definition by Hammersley (1987), validity is "an account [that] is valid or true if it accurately represents those features of the phenomena that it is intended to describe, explain or theorize" (Hammersley, 1987, p.69). For this study, validity is a complex issue as the chosen method is qualitative which makes it difficult as it is not possible to assess the validity of interviews due to its nature (Goodwin & Goodwin, 1984). Delving into the scholarly discussion on reliability, Campbell and Fisk (1959) describe the subject as the coherence between two endeavors to quantify the same attribute nearly identical procedures. The type of data that is gathered in this thesis includes a high level

of subjective viewpoints. The fact that qualitative data is commonly open to interpretation, means distinctive researchers could potentially end up comprehending the data in divergent ways and thereby present different findings, making it difficult to talk about the reliability of the results (Schoonenboom, 2023).

To guarantee data quality in qualitative research, several scholars have contributed alternative propositions. Guba, Lincoln and other fellow academics (1985) have developed a scheme of standards that enable the examination of qualitative research regarding its data quality: Credibility (1), transferability (2), dependability (3), confirmability (4) and authenticity (5).

With the term credibility (1), the author means the assurance that the results are accurate, implying that the study's participants judge that their documented comments in the study precisely portray their viewpoints in reality (Guba et. al., 2011). During the data collection, the researcher has from time to time summarized the interviewee's response, in order to avoid any misunderstandings. Furthermore, conducting the interviews has happened in an iterative approach with the goal to increase its quality. Additionally, questions in every expert group have been discussed and reviewed by the project's supervisor to increase their relevance. Moreover, data triangulation has been applied in this study to increase its credibility by involving a distinctive set of individuals, looking at the subject from different angles (Patton, 1999).

The second way to ensure data quality is to focus on transferability (2), which relates to whether the study's outcome can be classified as appropriate in order to use these in other frameworks which is why this thesis concentrates on providing a comprehensive understanding of the interviewee's answers and their examination. The author further suggests that dependability can additionally be used to encourage data quality. Dependability refers to the extent to which the outcome is reliable and can be reproducible (Guba & Lincoln, 1985). Throughout the whole process of this thesis, there has been a great emphasis on accurately portraying the interviewees' feelings and thoughts, as shown by the prolonged analysis phase that had the objective to provide relevant data. To reinforce the study's reproducibility, a comprehensive

methodology section is present to further give other academics a transparent insight into the data handling process.

Confirmability (4) evaluates to what extent the study's outcome is a result of the interviewee's answers instead of showing the researcher's prejudices, incentives, preferences and beliefs (Ali & Yusof, 2011). These factors have been closely monitored throughout the whole process of writing the thesis. At the onset of each interview, the researcher stressed the significance of capturing the participant's personal perspective. Furthermore, leading questions were avoided by utilizing open-ended questions and the researcher solely talked when summarizing what has been being said and asking follow-up questions. As a last point, the research project's authenticity was reinforced by consulting three distinctive expert groups to deliver insight into a variety of viewpoints (Guba & Lincoln, 1985).

5. Results

The fifth chapter displays the empirical findings of the gathered data that originate from the semi-structured expert interviews. The objective of this section is to systematize and analyze the results. In order to lay the groundwork for the reader's comprehension of the research question's response, it is fundamental and valuable for the study's outcome to include the expert's viewpoints on the overall subject of packaging design, the role of the packaging designer and the AI's interference in the design industry. Utilizing this technique of zooming in on the subject, enables the reader to fully comprehend the response to **the research question which outlines the impact of AI tools on the packaging designer's role in SMEs.** The analysis is organized according to Figure 7 which is shown below. Additionally, the fourth sub-chapter that presents the impact of AI on the packaging designer's role includes a Folk Taxonomy containing descriptive typologies, allowing the categorization of the collected insights and fostering connections of the various aspects to be able to elucidate the different types of impact.

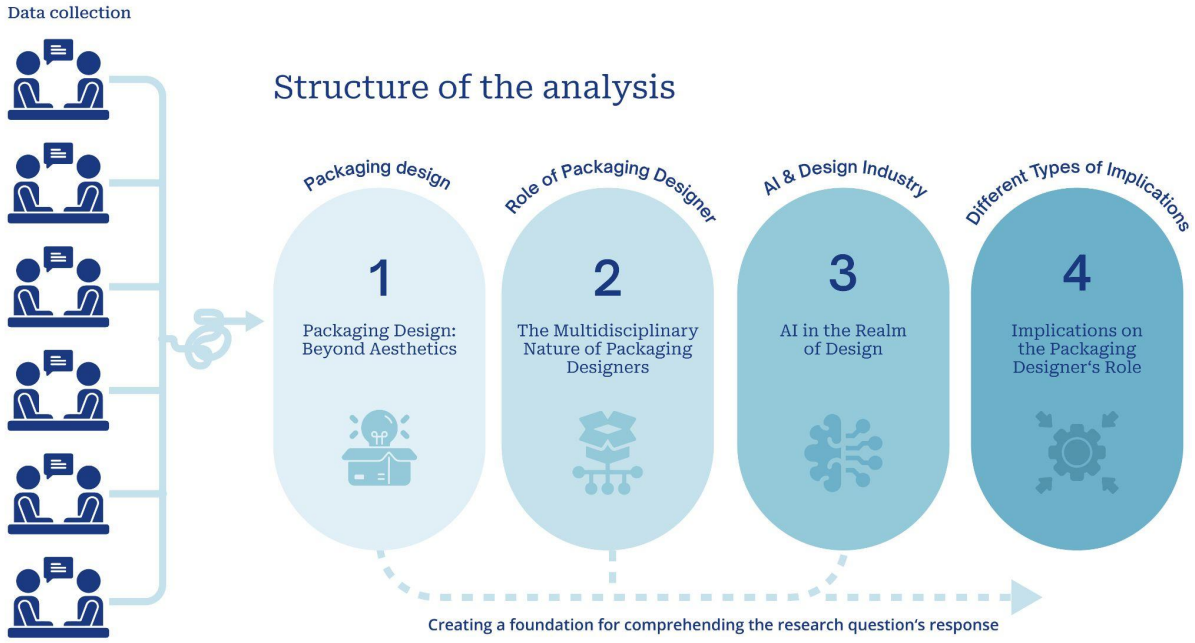

Figure 7: Structure of Analysis, Source: Own creation

5.1. Packaging Design: Beyond Aesthetics

To fully grasp the effect AI tools have on the packaging designer's role, it is crucial to take a step back and examine the cornerstone of their expertise and give an insight into what parameters packaging designers have to take into consideration when performing their duties, including the overall tendency to create consumer-focused solutions.

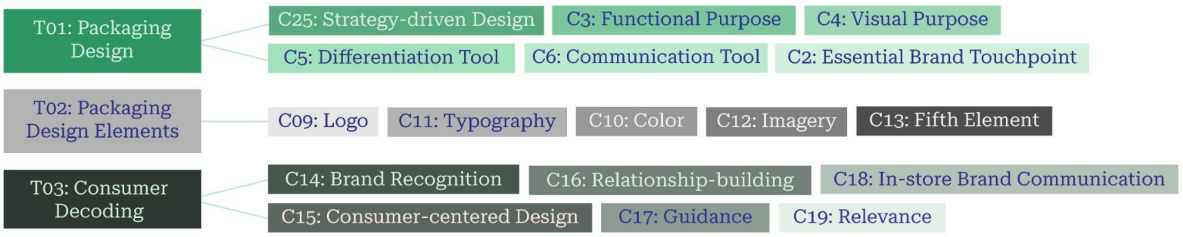

Figure 8: Relevant codes for sub-chapter, Source: Own creation

Executive Design Director Mikael Tonning clarified what the human eye sees when it looks at packaging design which is (1) *Logo*, (2) *Color*, (3) *Typography*, (4) *Imagery* and (5) the *Fifth Element*. He highlights the distinctive attributes of each element with an unconventional approach, describing the (1) *Logo* as "[...] the first element for people to understand that it comes from the same brand (I5, L.441-450). Additionally, he further explains the ability of (2) *Colors* to evoke

emotions. Even though an average person might not expect it, human beings actually actively think and talk about color, making it a strong element of packaging design (I5, L. 450-458). Following his argumentation this is different when it comes to (3) *Typography,* that he describes as "nerdy stuff" (I5, L.450) as the average person usually does not know different types of typography, though helps to create a setting around the product (I5, L. 459-478). Furthermore, he emphasizes the ability of (4) *Imagery* to tell a strong story and introduces the term (5) *the Fifth Element* - a hidden element, solely known by experts, linking a big range of products without the consumer actively recognizing it. To make it more relatable, he mentions how Arla uses a cloud as a fifth element due to the fact that "[...] many of their products come from cows. They want people to think that these cows are out in the free open, so they can see the clouds." (I5, L. 488-498).

The participants regard packaging design as extremely significant from a brand's perspective, due to its ability to connect the brand's identity and strategy, while fostering audience engagement (I1, L. 35-39). Lecturer and Brand Strategist Mette Vilsøe Lowth delve deeper into the importance of the topic for brands that have an overall tight budget for brand and marketing initiatives (I1, L. 28-31). The initial stage in the discussion about the packaging design's purpose centered on both *the Visual but also Functional Purpose*. Referring to the *Visual Purpose*, Vilsøe Lowth presents the terms "Front-stage products" and "Backstage products". In accordance with her reasoning, in most cases, consumers demand an aesthetically appealing "Front-stage product", where the consumer desires to showcase the product (I1, L. 390-399). Addressing the *Functional Purpose*, comments that stand out were made by lecturer and graphic designer Nanna Kanneworff, who assigns packaging design the role of protection to ensure the product's longevity - tapping into its relevance in widely discussed topics among the industries such as sustainability and also economically uncertain times (I1, L. 57-59).

A red thread throughout all interviews was that packaging design is *Strategy-driven*, as the field of design and strategy are heavily relying on each other. Design Director Jonathan Faust further explains "It can also be a bit tricky if you just do something because it looks nice and we never do that. We always have some strong arguments about why we do what we do." (I2, L. 59-65).

Apart from that, the interviewees have also largely described packaging design as a *Communication and Differentiation Tool*. Tonning makes references to the overall aligned visual appearance of the packaging while focusing on communicating one clear message, instead of five different ones as these otherwise won't be remembered. Besides, he describes packaging design that has strong communication as something that has "[...] the same thought, the same conceptual idea, the same voice, the same energy and the same feeling." (I2, L. 59-65). The experts within packaging design share the common understanding that packaging design, serving as a *Differentiation Tool*, can give the brand a crucial competitive advantage. Tonning further delves into the subject of competition by saying "Your competition is right next to you on the shelf. [...]. The battlefield is one centimetre away from you.", also mentions that this is a rare case for other design disciplines (I5, L. 83-88). Therefore, he appeals to brands that they need to be louder and differentiate by finding their Unique-Selling-Proposition (USP), which is the one aspect of the brand that makes them stand out (I5, l. 123-134).

A unifying element across all interviews is the fact that packaging design cannot be seen as something existing in solitude but rather being created with the consumer in mind. Tonning adds that differentiation is important in order to be relevant for the consumer, especially considering that targeting the consumer has become more difficult due to consumers increasingly becoming resistant towards traditional advertising efforts (I5, L. 178-193). He adds "If you want to build a bridge to a consumer, you have to be relevant." (I5, L. 192-193). The subject of *Relationship-Building* with the consumer has been a well-discussed topic throughout the interviews where a brand's notion about their idea of being superior, does not count as an efficient technique to connect with the consumer (I5, L. 151-160). Tonning posits that receiving first-time customers who first and foremost know the brand and are motivated to explore the product is an obstacle to overcome (I5, L. 151-160). Faust describes the product's external environment as an added struggle due to noise caused by an overload of brands and having less control of details such as lighting (I2, L. 414-418). *Brand recognition* and *Guidance* are supplementary salient features of packaging design as indicated by Tonning: "People are really busy, have always been busy, and people are also lazy. They don't want to use too much time." (I5, L. 100-104). Faust takes this idea further by saying "We always tell the client that

the consumer is the most essential part of your product. They need to understand it. If they don't buy the product. Like what do you have?" (I2, L. 443-448).

5.2. The Multidisciplinary Nature of Packaging Designers

For the purpose of evaluating to what extent packaging designers can make use of AI, it is crucial to investigate their everyday responsibilities and regular practices. In this manner, it is feasible to pinpoint particular stumbling blocks for the packaging designer and possible systems that slow down the improvement of the process.

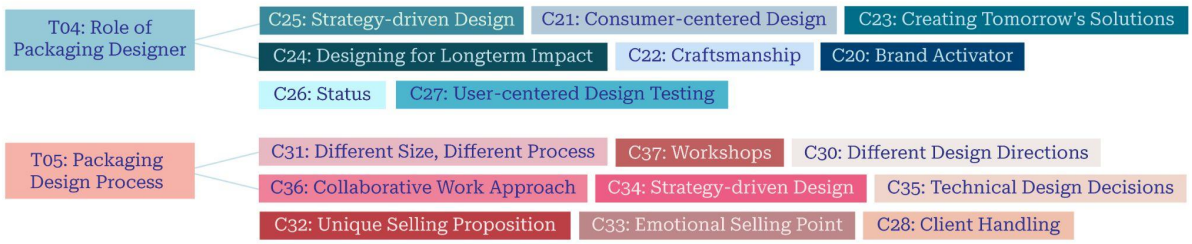

Figure 9: Relevant codes for sub-chapter, Source: Own creation

During all conversations, it can be asserted that incorporating *Strategy-driven Design* approaches are essential in every step of developing the packaging design solution. The interviewees mentioned that they often are confronted with the misconception that packaging designers' daily job exclusively is dedicated to producing designs that are visually pleasing to the eye. Kanneworff elaborates on this subject with the following words: "[...] just thinking that you can sit and draw something and put a few colors on it, that's not enough." (I1, L. 161-163). In fact, all interviewees share a common viewpoint on how complex the responsibilities of packaging designers are, whereas Vilsøe Lowth emphasizes the complicated undertaking of setting up design systems for brands with multiple products that strengthen differentiation on the shelf (I1, L. 226-231). Moreover, one particular skill that encourages Strategy-driven Design is the demand for crafting compelling arguments and challenging the client's creative briefs in order to make a firm and convincing case (I1, L. 275-281).

Describing the role of a packaging designer, all participants share a similar stance that the packaging designer's duty is to communicate the importance of *Consumer-centered Design* to all relevant stakeholders. On that subject, packaging designers are also expected to identify and comprehend the consumer's needs and preferences and a successful design solution requires the expert to ensure its work is "[...] tied back to strategy, tied back to reasoning and tied back to the consumers" (I5, L. 198-200, I1 L. 404-409). Kanneworff adds that its profession includes eliciting a reaction from the consumer, thereby affecting the consumer's buying decision (I1, L. 117-119). Additionally, Tonning explains that the packaging designer takes over the role of guiding the consumer with the packaging's appearance and needs to comprehend the psychology behind their decision-making (I1, L. 217-235). Equally mentioned was that packaging designers are responsible for *Creating Tomorrow's Solutions*, moving beyond the initial vantage point of solely designing for the present (I1, L. 95-98). It was stated that adaptability to novel process techniques, an eagerness for exploration, an innovative and strategic mindset and curiosity were all crucial factors to staying relevant in the future (I5, L. 488-494). Moreover, it is the duty of the packaging designer to *Design for a Long term Impact* to ensure the creation of a persistent solution that can stand the test of time, while balancing the implementation of trends (I1, L. 300-302). Being an essential part of establishing a brand has also been linked to packaging designers being *Brand Activators* (I1, L. 159-163). It was unanimous among all creative experts in the interviews that a packaging designer's direct connection to branding and the value of true craftsmanship have elevated the public perception and consequently led them to attain a more esteemed *Status* (I1, L. 120-124). To add to this, Vilsøe Lowth describes the packaging designers as: "[...] the heroes in the creative industry. [...] Some of the big awards now are about packaging design." (I1, L. 132-136). Another interesting function that was mentioned by several interviewees, was the ability to conduct *User-centered Design Testing* with a special focus on carrying out user research, developing prototypes and testing their design solutions, saving both time and money throughout the process (I1, L. 112-116).

The interviewees stressed that the procedures differ depending on the company's size. According to Tonning global companies have the "[...] challenge of being old" (I5, L. 271). Smaller companies experience difficulties in

connection to them being unknown in the market, requiring them to take bigger steps. Lastly, Tonning outlines that it is most complicated for medium-sized companies as "[...] they are not small anymore and they are afraid of being small again" and therefore "[...] want to grow, but don't dare to take the biggest steps" (I5, L. 276-288). Tonning elaborates that all stages of developing the packaging solution require close collaboration with the clients starting out with a brief, followed by *Workshops* to explore who's the client, which direction they want to go and equally educate them within the field. He strongly disagrees with making use of a black box, not presenting their work throughout the process, as it is essential to collaborate and have every stakeholder on board (I5, L. 391-409). Besides, Faust offers more insights into the actual routine of presenting three *Different Design Directions*, as "[...] there's not one solution." (I2, L. 105-118) in packaging design and that it helps to visualize for a company "[...] how radical you want to go with your packaging design." The three design directions are called the safe route, the evolution and the revolution (I2, L. 100-103). Both Kanneworff and Vilsøe Lowth mention the framework Double Diamond as a process for creating packaging design, following the steps of: Research, strategy, concept manifesto, mood board, different design directions, prototyping and testing (I1, L. 179-186). Furthermore, Faust describes that working styles differ among the individuals within the company (I2, L. 137-144). Embracing the Collaborative Work Approach, Tonning describes the packaging designer's role with the following words: "We [...] try to be really logical and explain stuff really simply for them because they're not working every day with what we do." (I5, L. 292-305). Having undergone the whole procedure, he points out the relevance of concluding the work by developing a brand manual for the client, evolving the previously described packaging design elements. In this way, Tonning says that it's possible for the client to follow clear guidelines for any future marketing initiatives (I5, L. 413-433). Faust stresses the significance of *Strategy-driven Design* in the packaging designer's role which is increasingly linked to the close collaboration with strategists (I2, L. 95-103). Though the packaging also includes *Technical Design Decisions* where accuracy is indispensable as the production often happens abroad (I1, L. 246-260). Another vital step in the process is described by Tonning as follows "It can be relevant while highlighting their *USP* to also find their ESP for the product which is the *Emotional Selling Point*." that "[...] addresses all the emotional reasons of a consumer to buy the product." (I5, L. 315-336) Additionally, he explains that

some brands disregard USPs and ESPs as they cannot see a direct financial return on investing in the development of these, but he adds that in the end, the consumer would rather purchase a product that has a strong brand story, again focusing on long-term brand building that the packaging designer has to communicate to the client (I5, L. 315-336). Lastly, all design-related interviewees highlighted the fact that *Client Handling* is a big part of the profession where the integral part involves convincing and educating clients (I2, L. 85-91).

5.3. AI in the Realm of Design

Due to the novelty and the continually changing sphere of the topic, several designers from different design specializations have been interviewed and shared their perspectives on the implementation of AI.

Figure 10: Relevant codes for sub-chapter, Source: Own creation

Senior Data Science Consultant Marie Normann Gadeberg, who works with making AI and Machine Learning accessible to organizations, starts out by emphasizing that the adoption of generative AI tools such as ChatGPT and MidJourney cannot be compared to the usual process of adopting technology within a company which starts out with management pushing for the tool implementation, being described as a top-down approach (I6, L. 274-282). According to her, one of the main drivers for the word AI becoming prominent within businesses is due to the fact that it has become a "[...] *Bottom-up Movement* because everybody has access to the tools". (I6, L. 269-274). Creative Director Peter Stenbæk evaluates the user's technology acceptance of

generative AI tools as outstanding, mentioning Chat GPT's success of receiving 100 million users after having launched half a year ago (I4, L. 387-390). Technical Director Anders Jessen states that the surge can be explained by several user groups encouraging, inspiring and also sharing knowledge within the field (I. 3, L. 459-462). Reflecting on the increased usage of AI tools by designers, Faust is surprised by the pace of this disruptive technology acknowledging the tools' *Progression*, even though he also describes the fact that designers have been making use of AI for a long time through industry-known programs such as the Adobe packaging already implementing AI in different tools such as the object selection tool (I.2, L. 163-170). Additionally, Tonning adds that the popularity of AI tools in design can be explained by their ability to create high-quality content and not being a fun playground anymore (I2, L. 59-62). Across all interviews, the subject of *Novelty* has been a supplementary discussion point when evaluating the field of technology acceptance due to the AI tools being new to almost all users and their capacity to significantly grow in performance in the near future (I. 3, L. 39-44). Faust also expresses that it is not always an easy task to deal with the novelty of technology from time to time with the following words: "If I need to learn a new software every time something pops up, it's crazy, you know?" (I.2, L. 151-157). On the more negative spectrum of the designer's reaction towards the emerging technology, expressing *Skepticism* and a *Counter Reaction*, Vilsøe Lowth describes the phenomena of some packaging designers being "[...] way too proud to say that AI can do as good a job as they do". (I1, L. 357-360). Furthermore, it should be mentioned that several interviewees found *Fear* as a factor that can stop an individual's technology acceptance. Referring to that nervousness, Jessen remarks "I think the whole argument that AI is dangerous is a misconception and that AI is going to take our jobs. That is also the reason why many people say "I won't touch it.". (I3, L. 541-551). It was a common sentiment among all interviewees that the *Lack of Knowledge* and the idea that it is not possible to predict what future capacities these programs have can shape the course of technology acceptance. According to Faust "If you're not young and curious about what's going on in that field, you're not going to notice it [AI tools]." (I2, L. 434-440). Besides, he remarks that humans have the tendency to be afraid to be perceived as unknowledgeable (I2, L. 577-591). Tonning also underlines the same fear on the client side "They don't understand it, they're just blank. They're not asking more questions because I don't know they don't want to look stupid because a lot of our clients want to be

in control. [...] I can see they're thinking a lot [...].” (I5, L. 577-591). On the other spectrum, the interviewees understand *Excitement* and *Expectation* as notable reactions towards AI, where people’s excitement especially has grown due to the vivid advancement of generative AI (I5, l. 53-57).

During the conversations, a general curiosity has arisen surrounding the dissimilarities between humans and AI. Vilsøe Lowth draws attention to the AI’s lack of *Human Senses*, which are according to her crucial as packaging design is relying a lot on a tactile feeling due to it being analogue in nature (I1, L. 457-466). Another key term that emerged throughout the interviews was the necessity of *Human Validation* while operating with AI tools. It is the packaging designer’s role to inquire if the AI system is “[...] telling the truth or not?” and has an emotional connection to the packaging design(I3, L. 259-261). As per the opinions shared by the interviewees, AI tools are inadequate in providing an ideal solution to problems that require a human’s gut feeling and their relatively quick ability to adapt to certain situations (I5, L. 698-707). Overall, there has been a shared opinion that AI tools “[...] are nothing worth without the input they get from humans” (I1, L. 436-439), as it does not possess the competence to think and question critically (I6, L. 737-747). Gadeberg continues by saying that it is essential to evaluate how the individual inputs information to the tool, as this determines the outcome (I6, L. 737-747). Other relevant comments were made by Stenbæk who clarifies that “Input equals output” (I4, L. 127-130) and Faust suggests that the public will become weary of the perfection provided by the AI tools (I2, L. 464-472). Lastly, the participants have greatly focused on terms such as *Collaboration* between the human and the AI tool and *Creativity*, placing two novel factors together and investigating it from a fresh perspective, which is not able to be accomplished by the AI application (I5, L. 531-536).

Gadeberg provided a more detailed clarification of AI’s nature, describing traditional AI, being “the ability of a computer to perform a task that normally requires human intelligence” (I6, L. 77-86), towards generative AI that addresses “[...] AI algorithms that can generate new content” (I6, L. 77-86). Moreover, she outlines the variety of steps that are involved in making these types of AI work, where the traditional approach requires data collection and time-consuming data preparation by a data scientist that would attempt to train the model to solve a particular task (I6, L. 88-99). Based on her input, all these stages are not

required anymore for generative AI tools as these are already trained which enables a much shorter road toward value creation (I6, L. 88-99). Gadeberg was responsible for some training in-house at the consulting company called Implement which required providing a framework that explains "[...] the way that you interact with the machine." (I6, L. 169-178). As she stated, there are four different categories, starting out with the act called dialogue, where the individual inserts input into the model and receives expertise back (I6, L. 177-185). Gadeberg identifies the second group as "[...] is generating the content for you" (I6, L. 185-192). The third category includes analyzing the content and "instead of just giving it a prompt or a natural language input, you give it some content to work from." (I6, L. 192-201), in order to drive an analysis of the content. Gadeberg specifies the most advanced way in which an individual can make use of generative AI is to feed the model with content and get modified content in return (I6, L. 201-205). Even though expressing excitement about the subject, all participants think it is equally vital for the AI implementation to have *Relevance* and as stated by Jessen "[...] it needs to make sense business-wise." (I3, L. 465-471). One prevalent theme in all conversations was the need for *Education* due to the fact that employees need to be taught how "to feed the machine right" (I1, L. 434-436). Stenbæk clarifies that these activities are called prompting where a variety of shortcuts and methods can be accessed on the internet (I4, L. 114-121). Though, Faust describes the dilemma of also having employees who do not adopt these new tools as naturally as others (I2, L. 524-531). Key suggestions discussed among the participants that could help our internal training, focus on inspiration, knowledge sharing and setting up tasks forces (I3, L. 503-506). Gadeberg expounds on a framework showing varying degrees of ambitions regarding AI implementation that has been developed in collaboration with the consultancy company Implement. The first two levels, which are highly recommended for any company to pursue, are called Foundation and Guidelines. According to her, employees need to receive corporate guidelines and training on what data they are not allowed to share (I6, L. 650-669). Gadeberg explains that the application of the next three steps, AI Strategy, AI Architecture and the employment of generative AI solutions depend on the level of disruptiveness that the business is experiencing (I6, L. 686-694). Nonetheless, she evaluates that it is imperative for content creation companies to apply this staircase approach (I6, L. 708-712).

Given Gadeberg's profound expertise in this subject matter, she was able to give an overview of *AI Development and Implementation Challenges*. Starting the discussion by explaining the significance of *Data Requirements*, where they as consultants often work with companies that "[...] don't have their data in good enough quality to be able to train these models." (I6, L. 382-395). Additionally, she mentions that smaller companies are often exposed to having both fewer data that is specific and representative to their organization and less structured data because they are able to "[...] survive with an unstructured approach to data for a longer time.", whereas big companies heavily rely on data in all their processes (I6, L. 395-402). She goes on by explaining "[...] People assume that AI is a magic wand. And the more complex we're doing our analytics, the higher the quality of the output will be and the more valuable it will be. But very often you can find a lot of value in just structuring your data [...] ." (I6, L. 428-434). Following her argumentation, larger organizations benefit from having their own data science team, intertwining AI into their strategic agenda. Start-ups integrate AI tools into their business core (I6, 143-147). Whereas, Gadeberg states that SMEs find it "[...] difficult to develop and gain traction with AI", due to them not having it as their core business value, though still having the wish to leverage the benefits of AI (I6, L. 155-163). An advantage for SMEs that have been mentioned in the interview is the fact that they have fewer stakeholders and approvers, while big companies usually require strong argumentation to get the decision of implementation through all levels (I6, L. 478-482). Other barriers that have been mentioned are the lack of *Financial Resources, Human Resources and Knowledge Resources*. According to the interviewees, the implementation of AI is connected to big costs depending on the level of application, which are easier to handle if it is a big company (I5, L. 271-276). Further, it has been mentioned that in economically uncertain times, companies usually tend to cut back on non-business critical activities (I1, L. 413-418). Based on the interviews, critical elements that need to be present when applying AI tools are individuals that comprehend and have the ability to use these tools, while also being able to share knowledge (I3, L. 507-514). Gadeberg concludes that another issue also could be the *Lack of Transparency*, where companies might find it difficult to evaluate how much they should communicate that an AI tool has been used in the solution and if that changes the perception of the outcome (I6, L. 618-630).

5.4. Modes of Implications on the Packaging Designer's Role Caused by AI Tools

By synthesizing former findings and extending upon strengths and limitations, a Folk Taxonomy has been developed to provide a more cogent basis for making sense of the multifaceted modes of implications, presenting Dumez descriptive typologies, that AI tools entail for the role of packaging designers. This subchapter stands as a vital part in addressing the research question directly and comprehensively but would have been insufficient without the foundational findings established in the preceding subchapters.

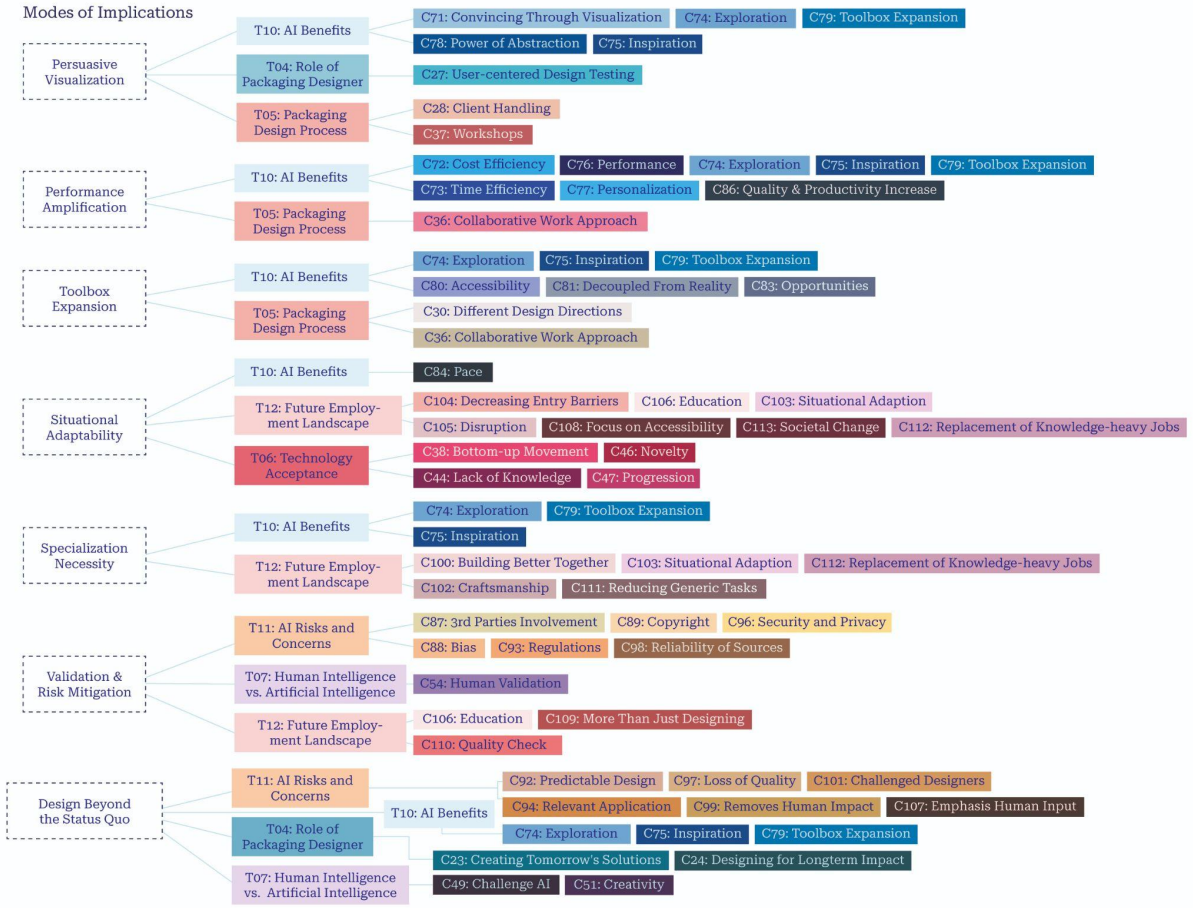

Figure 11: Folk Taxonomy adapted to the research question of this thesis, Source: Own creation

Persuasive Visualization

The first Mode of Implication of AI tools that exerts on the role of packaging designers is their ability to strengthen their skills within *Persuasive Visualization*. The interviewees have conveyed their contentment about AI tools

helping them to communicate their work better to other stakeholders, boosting their ability to *Convince Through Visualization* (I5, L. 554-566). Faust elaborates: “I would say it's easier for me to convince the client and show them what this concept can do for them”, while he also highlights the short time frame of translating the designer’s thoughts into a visual draft that can be presented (I5, L. 250-256). Additionally, he says that he can easily influence the clients to accept a proposal if they see it in a visually appealing mock-up on the shelf in the store with the right lighting (I2, L. 258-261). It is particularly beneficial if decision-makers within the client company have to take the idea one level higher in the hierarchy, for instance, a chair(wo)man, where a simple hand-drawn sketch would not be sufficient, according to Faust (I2, L. 263-267). The ability to *Convince Through Visualization* was also closely connected to the *Power Of Abstraction* based on the interviewee’s comments. Toning explains that “If you are a designer, you know exactly what black plus round plus X photo will become. I can feel that, I can see that, but they [the clients] cannot.” (I5, L. 566-571). Toning further explains that their customer base mostly consists of marketeers with a less strong level of abstraction, focusing on selling numbers and Excel Management and adds: “And then they have to talk about colors and feelings. They are like: “I don't know. What is that? Does that sell 3% more? [...] No, you can't promise that. So it's difficult for us sometimes to talk to them because it's not their playground. [...] But at this point, it's really helping us explain abstract stuff.” (I5, L. 543-571, I5, L. 532-538).

Performance Amplification

The second Mode of Implication of AI tools that affect the role of packaging designers is the designer’s opportunity to experience *Performance Amplification*. Particular subjects which have been discussed in the interviews were *Time and Cost Efficiency*, where Faust gives the following example: “[...] now I can just produce 100 different bottles with weird shapes, colors and whatever, and test it out and just send it through [...]. It's super-efficient. And often I can skip the product designer and just show it to the client.” (I2, L. 224-234), while also emphasizing that this is only for the sketch phase. Furthermore, Jessen points out that the time spent on finding the right artist to employ for the project and the briefing could be drastically decreased by the application of AI tools (I3, L. 154-156). Bringing in some real-life numbers,

Gadeberg refers in the interviews to an effectiveness report done by MIT that shows a 40% productivity and a 15% quality increase by applying generative AI tools, giving enough evidence for companies to educate their employees on such applications. She delves further into the topic by saying “[...] if you're looking at a 40% increase [...]. [...] Then you can do the five days' work in four days' time, right? Maybe this is the solution that we've been looking for in order to move toward the society that we want [...]” (I6, L. 242-260).

Toolbox Expansion

The third Mode of Implication of AI tools that have consequences for the role of packaging designers is the opportunity to encounter their *Toolbox Expansion*. In that connection, there are several generative AI programs such as ChatGPT, MidJourney, Stable Diffusion and Adobe Firefly that have been mentioned in the interviews to foster *Exploration* and *Inspiration*, particularly being driven by its *Accessibility* to the public (I3, L. 300-305, I2., L. 294-299, I6, L. 282-287). There was an overall agreement that these tools contributed with substantial support, especially in the development stages that require research and brainstorming ideas (I2, L. 208-212). Tonning underlines that collaboration with AI programs is often the root of introducing fun to the designer’s work which is essential for the packaging designer’s overall job satisfaction (I5, L. 625-631). He expounds on it using the following words: “It's driven by having fun. It's not driven by earning money. If I want to earn money, I would work in a bank [...]. But it's about having fun every day and challenging the rules that you know. And that [AI tools] would help us a lot.” (I5, L. 625-631). Additionally, Faust highlights the importance of being able to imitate a new sketching or illustration style, where previous designers often have specialized in one type of aesthetic, posing limitations for the designer to go beyond their current skill level (I2, L. . 261-269).

Situational Adaptability

The fourth Mode of Implication of AI tools that change the role of packaging designers is their competence to empower their level of *Situational Adaptability*. During the interviews, several participants expressed that AI tools are being introduced at an accelerated speed, turning the overall field of design into a

dynamic field with frequent developments and changes (I3, L. 52-59). Jessen expounds on this observation by saying "[...] designers need to focus, they need to get in the game and use these tools or else they'll get lost behind. That's how it is with all types of technology." (I3, L. 177-182). Furthermore, he describes the advancement of AI tools as follows: "It will upend a lot of things [...], the way we design but also the way we think about education. (I3, L. 357-366). Other interviewees who see education as an equally important focal area on the agenda, in order to ensure that the new generation of designers is well-equipped for the future, are Kanneworff and Vilsøe Lowth (I1, L. 550-553). The consequences of not being open to adapting to new situations could have a severe aftermath for designers (I5, L. 526-532). Jessen takes the idea further by explaining "[...] it will disrupt jobs and some people will lose their job because their job isn't necessary anymore, but at the same time, it will also give so many people access to tools and possibilities that require specialized knowledge, that they did not have before." (I3, L. 189-193). Gadeberg particularly highlights that previously the public's perception was that AI tools will replace automatized jobs, but actually, it has now the capacity to replace high knowledge-based work, requiring the individual to adapt to new situations (I6, L. 719-730).

Specialization Necessity

The fifth Mode of Implication of AI tools that modify the role of packaging designers is the designer's need to prioritize *Specialization Necessity*. There are mixed comments about the risk of getting replaced by AI tools. Tonning perceives the AI solutions that are currently on the market rather as tools, than something that will take over the process. He draws parallels to the fact that the introduction of advanced calculators has also not eliminated the existence of mathematical experts (I5, L. 639-645). Jessen states that there are several generic manual tasks that potentially will be automated and replaced by AI programs which gives the designer the chance to operate in a more specialized sphere (I3, L. 197-200). Moreover, Tonning expresses agreement on the point of reducing general work, stating "AI needs designers to work. I would rather say AI will replace more generic work.", being able to spend more time diving deep into a particular skill (I5, L. 649-656). In conjunction with recognizing the disruption by AI programs, Jessen expects to see a counter-reaction towards the disruptive technology and several designers feeling the need to specialize their skills

within a niche market, for instance, the hand-crafted field (I3, L. 210-216). Faust mutually agrees on the potential development of a counter-reaction and anticipates that the "[...] the collaboration with an actual illustrator or photographer [...]", will become prominent as humans will become tired of the perfection and that it "[...] works really well that you can adapt a style without stealing it." (I2, L. 456-472).

Validation and Risk Mitigation

The sixth Mode of Implication of AI tools, affecting the role of packaging designers is to delve into further responsibilities that touch upon a greater business understanding such as *Validation and Risk Mitigation*. Several concerns have been mentioned such as third-party involvement when making use of AI tools, possible bias, copyright infringements, security and privacy issues, source reliability and the need for regulations. Gadeberg states that especially smaller companies rely on third-party tools because they do not have the financial resources to train their own model (I6, L. 490-517). Additionally, she says: "They [The third-party companies] have the autonomy to do with the model as they want." (I6, L. 490-517), potentially being able to introduce bias to the system, make changes in their resolution, introduce pricing or hurt privacy laws that leave their user with a lack of control (I6, L. 490-517). According to Gadeberg, another risk is third parties being able to use the data that the user inserts. OpenAI, the provider of ChatGPT, has acknowledged that this is a problem and therefore recommends companies use their API instead of their interface with the benefit of not using their data (I6, L. 490-517). Gadeberg mentions though that the data will still be saved for 30 days with the chance to sign a standard contract which is usually not sufficient enough for Danish companies. Besides, Gadeberg highlights the issue of the data being stored in the US, having different laws regarding the use and storage of data compared to Europe, that underlie the Schrems-II regulation and GDPR (I6, L. 490-517). Based on the interview's findings, packaging designers are also urged to apply critical thinking potentially being exposed to the danger of misinformation when making use of AI tools and acknowledge that the outcome can be biased and that it "[...] is not just the truth of the world" (I6, L. 459-470). The most discussed topic in all interviews was copyright and how the packaging designer needs to be even more aware of that subject when making use of AI tools. Gadeberg

reflects on two scenarios - one of them concerning who owns the copyright of generated content that makes use of another designer's style. Secondly, she considers the situation of a designer creating something unique in a generative AI tool and asks "Who has the copyright - the designer or the company behind the tool?" (I6, L. 569-589). In addition to that, Faust flags that everything needs to be on point in their client's work, having to deal with copyright infringement would bring them into big trouble (I2, L. 500-502). Suggestions that were discussed to mitigate the risk were employing an internal task force dealing with legal issues and introducing regulations that put copyrights on prompts (I6, L. 594-604). On top of that, several interviewees stressed the need for designers to take over the role of validation as they believe that the final touch of design will still be done by humans due to their higher level of judgment (I1, L. 370-372).

Design Beyond Status Quo

The seventh Mode of Implication of AI tools, changing the role of packaging designers is for the professionals to *Design Beyond Status Quo* to future-proof their careers. During the interview, the participants bring attention to the disadvantage of AI tools presenting predictable design. Stenbæk describes this issue as such "Everything looks too similar, has the same feeling, and the same atmosphere." (I4, L. 180-184), while criticizing people that make the convenient choice, fostering laziness, calling it "destructive to human beings" and encouraging designers to challenge their solutions and empower creativity (I4, L. 315-320). All interviewees agree on the significance of being aware of what AI tools are being used for and reflecting on their relevance and not forcing the result to fit into the design solution (I2, L. 454-456, I5, L. 631-635). Asking about the likelihood of AI tools replacing designers, most participants disagreed and brought similar explanations such as those given by Tonning: "[...] You can see that creative people need to program this tool because it's only as clever as your ability to program the tool. [...] if you are more like a square person or an Excel-type person, you will never be able to use the tool to get the right result because you're not abstract thinking." (I5, L. 659-666).

By now, it should be established that packaging design is a field of multiplicity serving visual and functional purposes, one of the brand's most important

touchpoints for differentiation and communication and relies heavily on attracting and persuading the consumer in a purchase situation. Additionally, based on the interviews, it should be clear that the packaging designer wears many hats where it is necessary to not only have a holistic overview of design-driven decisions such as craftsmanship but also of strategy, future-oriented solutions, brand activation, user-centered design, client handling and marketing terms such as USP and ESP. Furthermore, AI has been discussed in the sphere of design, describing the rise of AI tools as a bottom-up movement, technology acceptance based on mixed reactions by the public, the debate about AI vs. human intelligence, its focus on education and a strong advice to implement AI into every content creation business. The results of the previous subchapters lay the foundation for the reader to understand and see the full picture of the implications that AI tools have on the packaging designer's role, which is strengthening their *Persuasive Visualization, their Performance Amplification, Toolbox Expansion, Situational Adaptability,* require *Specialization Necessity*, *Validations and Risk Mitigation* and the need to *Design Beyond the Status Quo*.

6. Discussion

The overall goal of the analysis section was to establish an understanding of the field of packaging design, the packaging designer's role and the potential of applying AI as a hands-on designer and its potential influences, to adequately address the research question of this Master's thesis which is: **What implications do AI tools have on the packaging designer's role in SMEs?** The five individuals and the one group interview have been the cornerstone to first create a coding tree that entails critical knowledge within packaging design, the packaging designer's role and AI in the field of design, which paved the way for the Folk Taxonomy, shaping the descriptive typologies that display the seven different Modes of Implications that AI tools cause on the packaging designer's role in SMEs and additionally help to theorize the study's findings. The subsequent discussion covers the answer to the research question, being the seven different Modes of Implications, and will additionally analyze how the investigation's findings align with or diverge from the literature within the field and provide possible explanations for the results. Lastly, after each section, it will be discussed what are the implications and what the outcomes mean in

practice. The hypotheses of this study suggest that AI tools cause implications on the role of packaging designer's role as followed. It will strengthen the individual's level of *Persuasive Visualization (1)*, cause *Performance Amplification (2)*, enable *Toolbox Expansion (3)*, reinforce *Situational Adaptability (4)*, imply *Specialization Necessity (5)*, introduce *Validation and Risk Mitigation (6)* to the packaging designers role and lastly encourage them to *Design Beyond the Status Quo (7)*.

6.1. Discussing Persuasive Visualization

In the forthcoming section, the first hypothesis will be discussed, outlining that AI tools benefit the role of the packaging designer in SMEs by providing solutions with the help of *Persuasive Visualization*.

The most important findings of the analysis were that the interviewees see generative AI tools such as MidJourney as an assistant to convey their work to other stakeholders, allowing them to show their abstract thoughts on paper and thereby increase the chance to convince through visualizations. An interesting observation is that the interviewees mentioned marketers sitting on the client side, who usually have a low level of abstraction, rather than focusing on numbers. Reflecting on that statement, one could argue that AI tools such as MidJourney help to connect the dots between the comprehension of the designer and the one from the client side. Additionally also implying that highly creative individuals have different ways of thinking compared to normal- or non-creative individuals, while also having divergent objectives. Considering that all interviewees who are directly involved in the process of creating packaging design largely spoke about navigating client interactions, this only emphasizes that all tools helping to guide the client experience are advantageous for the worker's role.

Comparing these aspects with existing literature, it becomes notable that there are not that many existing studies that academically prove that AI tools help to power the level of abstraction due to the overall lack of research within that area. Furthermore, many applications are at a beta-version, where it will take a few months for big companies such as Adobe to fully develop their tools to evaluate which benefits for the packaging designer's role can be derived from

these. Though, there are a few pieces of literature where it seems logical to discuss the implementation of AI tools to reinforce persuasive visualization and thereby approve the stated hypothesis. For example, the Design Development model established by Ulrich and other fellow academics in 2004, where it could be argued that AI tools can help in the evaluation and testing period of the concept design phase and lastly also in the refinement stage to support alpha and beta testing (Eppinger et al., 2019). Bstieler and Noble (2023) argue that the designer can be supported by AI tools, particularly in the early development phase as these on the one hand help to get abstract ideas on paper. Furthermore, the authors suggest that these illustrative graphics can help to detect early-stage errors and tweak the design to become the best possible solution. Combining Bstieler and Noble's argumentation and the results of this study, it can mean in practice that even if the individual is a skilled packaging designer, with the lack of articulating their vision, they will struggle to thrive in business. Another relevant piece of literature in that connection is provided by Azzi and his academic colleagues (2012) that link the packaging designer role's popularity directly to their ability to showcase packaging design, communicate the brand's identity and influence the decision-making process. Following that train of thought, one could argue that the packaging designer's ability to visualize their ideas persuasively, could make the packaging designer's work more valuable - providing another argument for applying AI tools within the design process.

6.2. Discussing Performance Amplification

Moving forward, the upcoming segment will discuss the second hypothesis, describing that AI tools show significant advantages for the packaging designer's role regarding *Performance Amplification*.

The main discoveries of this study's analysis are that the interviewees highlight time and cost efficiency when utilizing AI tools in their design processes as they can perform some of the tasks conventionally delegated to personnel from other expertises that are also time-consuming to identify for each project. The most surprising reflection of the interviews is the ability to make a societal change, reducing the work week from 5 to 4 days through the application of AI tools, giving a 40% productivity and 15% quality increase (I6, L. 242-260).

This goes hand in hand with existing literature that acknowledges the human's limitation of speed and capacity, emphasizing that there are a couple of processes that can be automated (Iansiti et al., 2020). Delving further into how designers can experience *Performance Amplification*, experts within the field mention that the collaboration between humans and AI can cultivate creativity, and inspiration, nourish innovative thinking and broaden horizons (Koch, 2018). This selection of literature moves the discussion of enhancing the packaging designer's performance from the simple explanation of speeding up processes and thereby improving performance to create a better end result by having the opportunity to consider different angles with the application of AI tools, consequently strengthening the designer's performance. Pondering this thought, one could argue that the role of a packaging designer matches the role of a project manager which includes handling the project's time frame, cost and quality, based on the study's results on all areas that could benefit from the employment of AI tools (Anderson & Ziek, 2015). One aspect which has not been mentioned in any of the interviews is the ability of AI tools to help the individual overcome mental barriers to creativity. Guzdial and other scholars (2019) describe how it is a natural feeling for humans from time to time to experience creative resistance. Possible explanations for why this has not been a major discussion point of the interviews could be that creative blocks are often associated with negative feelings such as second-guessing oneself, making it a sensitive subject (Ebigbagha, 2019). In practice, this means that AI tools could push packaging designers past creative hurdles and thereby increase their overall job satisfaction. Lastly, connecting it with the Technology Acceptance Model, which has the goal to predict the individual's likelihood of adopting a new technology, it becomes apparent that the packaging designer's cognitive response relies on the perceived ease of use, but more importantly the perceived usefulness (Granić & Marangunić, 2015). In operational contexts, this suggests that if the person is unable to perceive the advantages of AI tools, the probability for them to apply the emerging technology is low, conversely not being able to experience *Performance Amplification*. This suggestion is aligned with prior existing literature, that not reflecting on applying AI tools in the process, can lead to being outcompeted and failing to keep up with changing market trends (Moghavvemi et al., 2012).

6.3. Discussing Toolbox Expansion

To continue, the next section will discuss the third hypothesis, illustrating that AI tools enrichen the packaging designer by providing them with a *Tool Expansion*.

The most essential findings of the analysis section are that the application of AI tools broadens the skill set of the packaging designer by fostering inspiration and encouraging exploration, which particularly amplifies the design process in the development phase, involving probing and brainstorming. Additionally, exploration has been mentioned as the main reason for an individual to even get into the design industry as it is not driven by money. In practical terms, this signifies that AI tools could bring packaging designers back to the roots of their craftsmanship which is to train their muscle of creativity.

Taking the discussion further by evaluating the previously existing literature on the subject of extending one's range of tasks, it is actually favorable to be able to perform tasks in different spheres of skills, particularly in SMEs where restricted monetary resources force employees to take on responsibilities that exceed their educational background (Demirkan et al., 2021). This has practical implications for packaging designers, as SMEs take the biggest part of the market (World Bank, 2023). Hence, the chances that packaging designers are employed in an SME are relatively high and thereby improving their employment chances by meeting their demands. Continuing on that train of thought, businesses are used to employing individuals having a specific skill set and they are familiar with the limitation of their staff's knowledge. However, it would be compelling to observe in the future if this perspective would change. The interviews of this study also evolved around human limitations and how packaging designers are often specialized in one type of style, where the individual might find it challenging to venture outside of their skill set. To conclude, previous studies have stated that packaging designers actually have gone through opening up their toolbox previously in history, mentioning the intervention of digital design programs as an example, which also lowered the barrier to entering a design career (Sun & Yang, 2016). Finally, it is intriguing to examine the technology acceptance among the involved parties. Given that

digital software has become the industry standard, it is worth investigating whether AI tools will follow suit in the future.

6.4. Discussing Situational Adaptability

To proceed, the next subchapter will discuss the fourth hypothesis, showcasing that AI tools can impact the packaging designer's role by boosting their *Situational Adaptability*.

The study's major revelations are that all participants suggest packaging designers familiarize themselves with AI tools and comprehend the contexts of when their application is appropriate and how to utilize these. A prominent topic that seems to be a recurring theme was its level of disruption. Whereas some interviewees express that it will solely be seen as a collaboration tool for the designer, others forecast more severe consequences such as job replacements, not only including manual or low-skilled jobs but also knowledge-intensive tasks. Though, on the positive side the participants comment on the idea that more individuals will have access to specialized knowledge. A central point of discussion is the fundamental necessity for packaging designers to prioritize education in utilizing AI tools to safeguard their careers for the future.

Examining the scholarly literature within the domain of *Situational Adaptability*, it is again widely agreed upon that packaging designers have been faced with the task of adjusting to new conditions, implementing more digital elements to their design solutions such as QR codes (Ataizi et al., 2016). Several scholars express their curiosity in why employees question if they need to adapt to new market changes, as there has not been a single industry that has not been affected by technological advancements, where adapting to novel situations can prevent them from being outcompeted (Brougham & Haar, 2020). Here it would be compelling to understand why humans find it difficult to adjust to unfamiliar situations. Bidarra and his fellow research partners (2018) argue that the trust and thereby also the usage of novel technology, is closely linked to the user's apprehension of the tool. Further explanation can be found in the Theory of Planned Behavior Model that finds reasoning within the level of intricacy that humans experience while utilizing the tool which is also

nourished by their access to resources such as education (Ajzen, 1991). Additionally, it is stated that the likelihood of individuals making use of the novel technology drastically increases once being exposed to the tool (Beer et al., 2017). In practice, this means that if another individual demonstrates the tool's ability to the packaging designer, this would ease the barrier that they encounter. Both from a business and employee perspective it would be advantageous to form a task force that has the objective of facilitating the implementation of the tool among other employees in a variety of departments. In fact, previous studies have shown that adopting operations that link individuals with a diverse skill set, can foster innovation within the company (Baker, 2011).

6.5. Discussing Specialization Necessity

In the forthcoming paragraphs, the fifth hypothesis will be discussed, describing that AI tools can affect the packaging designer's role by evoking *Specialization Necessity*.

When reflecting on what can be done as a packaging designer when being exposed to the overall popularity of AI tools, several interviewees mentioned that the individual can pursue specialization to ensure their continued relevance. This is largely driven by the expectation that mundane tasks will be automatized, leaving space for getting back to the roots of packaging design which is craftsmanship and building a niche segment. Additionally, the interviewees comment on reducing generic tasks from their agenda as something positive, freeing up space in their calendar for jobs that bring contentment. Another relevant outcome of the thesis's study is the overall expectation of a counter-reaction towards the usage of AI tools such as the public becoming tired of the perfection, which they state is beneficial for designers that stay true to their craftsmanship.

Having a look at what experts within the field say, it is notable that the perfection of AI tools is also discussed and explained by its ability to be more accurate, compared to humans that according to studies make 50 errors on a daily basis (Thomson, 2018). Nevertheless, in real life making errors is not solely seen as something negative, as individuals are able to receive knowledge from

their errors that perhaps previously would have been undiscovered. Hence, following that argumentation, it is questionable if perfectionism is always something to strive for, still making the human relevant for the field of design. Other literature suggests that the role of the packaging designer, who has a more holistic overview than the AI tool, will move into the area of sensemaking, bringing it closer to leadership as a result of tasks being automatized (Verganti et al., 2020). At the same time, experts describe the application of AI tools as an opportunity for humans to reconsider the definition of work and what a meaningful job consists of, such as self-actualization (Dignum, 2017). Similar statements can be observed in the interviews such as productivity increase that could lead society from a 5 to 4 days work week. In practical implementation, this reflection brings the subject of AI application to a whole new level, moving it away from what it can do for a business and for the packaging designer's role to what it can provide for the individual and for society in general.

6.6. Discussing Validation and Risk Mitigation

In the next section, the sixth hypothesis will be discussed which portrays how the application of AI tools moves the role of a packaging designer into the realm of *Validation and Risk Mitigation*.

A significant result of the study was a long list of challenges for the packaging designer when making use of AI tools such as third-party involvement, biases, copyright infringements, security and privacy issues, source reliability and the need for regulations which means that the role of responsibility taps into legal risk management. Furthermore, it does not only concern their image and the legal protection of the individual but is also highly connected to the protection of the client's side, being one of the most important stakeholders for packaging designers. First of all, the packaging designer can ensure that no business-critical information will be shared with AI tools, but rather use it as a source of inspiration. Secondly, they need to apply critical thinking and reasoning, a characteristic that AI tools currently do not hold, to avoid misinformation and misuse of the technology. Besides, that argument also explains why packaging designers will still hold the role of validation throughout the whole process, due to their unique level of judgment, equally supported by Fisher and Maher (2012). However, it is important to outline that

there are several variables beyond the individual's reach such as all actions handled by the third-party provider, the complex question of copyright when it comes to AI-generated content and the lack of regulations.

Considering the finding from prior literature, it becomes evident that all previously mentioned concerns are also subjects of scholarly debates. Though, papers such as those provided by Haenlein and Kaplan (2019) go even deeper into the serious repercussions of the AI tool's misuse and strongly call for regulations within that field. The plea of regulations has also sparked extensive discussions within the public realm, lastly being fueled with an open letter written by a cluster of prominent and knowledgeable technology experts, demanding to pause the development of AI. The attempt of stopping all AI advancements for half a year to introduce safety measures has not been discussed in the interviews due to its novelty. Nevertheless, it brings an interesting dimension to the discussion, where one might wonder if it is even realistic to stop the swift progression within that specific field. Especially considering that Denmark is one of the most digital countries and most businesses already operate with AI. From a critical standpoint, it can be posited that other big innovations such as globalization can also not be taken back. Another subject that only has been slightly touched upon in the interviews, is given by Kietzmann and his colleagues, taking the idea of misinformation further and explaining the term of deep fakes that are artificially created false graphics. These are pushing the boundaries of reliability even further, as compared to written material, visual representations are more complex to identify as fake (Kietzmann et al., 2020). These have driven debates within the design field referring to sourcing a particular piece and marking it as something that has been created by AI.

6.7. Discussing Design Beyond the Status Quo

In the forthcoming segment, the seventh hypothesis will be addressed, illustrating how the application of AI tools will move the packaging designer's role toward the direction of pushing boundaries and *Design Beyond the Status Quo*.

It is highly likely that generative AI tools create similar content. Several interviewees mentioned the risk of the design expertise being flooded by predictable design. Nonetheless, reflecting on this finding, it is also vital to point out that this would be the worst-case scenario with the assumption that no designers feel the urge to go beyond mediocre quality. Finding a possible connection between predictable design and the fear of designs converging towards uniformity, the explanation can be found in the comments of one of the interviewees, who calls out the nature of humans who are lazy and searching for the convenient choice. All participants agree that the AI tool should solely be used as a collaboration partner and not take over the helm, which implies striving for the best possible solution and only making use of AI if it fits the case.

Entering the academic sphere, Guzdial and his fellow scholars (2019) acknowledge the fact that a potential disadvantage of relying on AI tools can lead to uniform aesthetics caused by worn-out trends being emphasized by the software. Other experts within the field build upon that idea by expressing their concern to see a lack of true creativity (Baidoo-Anu & Owusu Ansah, 2023). Overall, it can be said that if packaging designers become too comfortable and pursue the design solution that seems easiest accessible, the industry can be faced with severe challenges due to the fact that they are equally taking part in influencing the future for instance within the field of sustainability through implementing innovative design decisions. Additionally, it could potentially lead to a large number of products looking too similar on the shelf, not benefiting the consumer who already now experiences choice overload in a purchasing situation (McShane, 2015). Despite this outlining a worst-case situation, it is essential to state that even a slight change in the ambition to develop unique and innovative design solutions can have an impact on the packaging designer, the consumer and thereby also on the organization.

6.8. Limitations

This chapter has the objective of outlining the limitations that have been faced during the development of this thesis. It is vital to remember that in-depth research with only a specific amount of time and budget in disposal can decrease the project's scope and thereby also affect the comprehensiveness of

data exploration and assessment. Additionally, it is important to recognize the sample size being 7 individuals, posing another limitation due to its nature of being exploratory and thereby removing the opportunity to be generalized to a bigger context.

Moving on, it is noteworthy to consider any bias created by the researcher during the investigation. One of them is the researcher carrying extensive knowledge of the design industry itself. These factors increase the risk of introducing bias in the data collection phase and may have affected the findings. Nevertheless, all required precautions were taken in order to minimize this risk, though it is complex to remove the researcher from their previous background and impossible as a human being to look at phenomena purely objectively.

Moreover, two different sampling techniques have been utilized in this thesis: Snowball and convenience sampling. Snowball sampling can also entail drawbacks, such as solely focusing on one specific group of people, sharing identical life patterns and being very similar, which might make it hard to include a representative person from other circles. Following that argumentation, convenience sampling could bring the same challenges, as the participants are found in the researcher's own network. Hence, there was a great focus on not selecting any possible interviewees that are in any way interacting with the researcher on a regular basis. Though, it is crucial to keep in mind that this perhaps can have created bias.

Furthermore, the demographic details of the interviewees outline another limitation as their age range lies between 28 and 55, that may not comprehensively follow the standpoints of very young or much older individuals. Traditionally seen, is technology acceptance closely related to age which makes it a worth-mentioning factor in this particular context. Besides, all interviewees were Danish which does not include foreigners, posing another limitation. All interviews were held in English, which potentially could have an impact on the participants' comments due to language restrictions and thereby also posing the risk of not capturing the full picture, decreasing the richness of data.

Finally, it is significant to recognize that there may be more Modes of Implications caused by AI tools, affecting the packaging designer's role. Either the explanation can be found in interviewees not referring to them or another prioritization of topics in the coding phase. While efforts were introduced to mitigate the risk, it is vital to acknowledge that additional research may unfold more Modes of Implications.

7. Conclusion

The following chapter has the objective of offering a systematic outline and illustrating key findings of the thesis and additionally providing a sufficient answer to the thesis's research question. The adoption of novel technology, including AI tools, has been a key subject of research, generating overall interest from academics and industry experts due to its ability to disrupt industries and drive significant changes in business operations. In light of this background, the field of packaging design, relying on human skills and dexterity, has captured the researcher's attention, as the utilization of AI tools has generated a wide spectrum of feelings embracing a wide spectrum from excitement to concerns referring to the impact on the packaging designer. Even though previous research within this field is narrow, leaning towards digital design while overlooking analogue areas such as packaging design, giving an overview of the consequences of AI tool application on the packaging designer's role possesses a variety of benefits. It enables the packaging designer to strengthen their comprehension of the implications, ways to adapt, potential perks but also drawbacks and lastly direction on future-proofing their career. Furthermore, focusing on the perspective of SMEs is equally important as these encompass an essential part of the economy and employ a substantial part of packaging designers and are under competitive pressure due to their dynamic nature.

The key objective of this thesis is to delve into the variety of facets that AI tools offer to the packaging design expertise and analyze the implications of their employment on the packaging designer's role. Through the procedure of organizing, sense-making and classifying the thesis's outcome using a Folk Taxonomy, and subsequently theorizing them with Dumez's descriptive typologies, while drawing comparisons with prior literature, seven Modes of

Implications have been developed. These Modes of Implications, formed by the seven corresponding hypotheses, provide the theoretical contribution of this thesis, as it is the answer to **the research questions about how the packaging designer's role in SMEs can change with the application of AI tools.**

The first Mode of Implication and hypothesis outlines that AI tools benefit packaging designers by providing solutions through enabling *Persuasive Visualization*. Essential insights stress that the packaging designer's role entails client handling and dealing with stakeholders having different levels of abstraction. Generative AI tools, for instance, MidJourney, bridge the gap between individuals with contrasting levels of creativity by delivering a swift generation of design ideas.

The second Mode of Implication and hypothesis describes that AI tools if individuals are aware of the perceived usefulness and know how to utilize these, put forward great advantages by providing *Performance Amplification*.
Participants stressed the time and cost-saving factor, as they enable designers to perform tasks that would usually demand input from employees in other fields. AI tools further strengthen creativity, inspiration and innovative thinking, while removing barriers that may block the creative procedure.

The third Mode of Implication and hypothesis illustrates that AI tools enrich packaging designers by providing them with a *Tool Expansion*. With the help of software such as MidJourney, Stable Diffusion, Adobe Firefly and ChatGPT, packaging designers have the ability to extend their skill set and access other fields of expertise. This adaptability is especially precious for SMEs, where staff frequently fulfill numerous distinct tasks as a result of restricted resources.

The fourth Mode of Implication and hypothesis is showcasing that AI tools can impact the packaging designer's role by fostering their *Situational Adaptability*. The study's outcome discloses unease about job replacements, with some identifying AI tools as collaborative assets, while other experts shared their observations about the substitution of knowledge-heavy jobs, which calls for packaging designers to adapt to the new circumstances and be exposed to proper education.

The fifth Mode of Implication and hypothesis clarifies that the application of AI tools can affect the packaging designer's role by evoking *Specialization Necessity*. The study's findings, in conjunction with the literature review, suggest that all mundane tasks will be automatized, allowing packaging designers to seek specialization in niche segments to secure their constant relevance and improve their job satisfaction by evaluating the definition of a meaningful job. Additionally, with the implementation of AI tools experts believe in the possibility to transition from a 5-day to a 4-day work week.

The sixth Mode of Implication and hypothesis portrays how the application of AI tools positions packaging designers in the realm of *Validation and Risk Mitigation*. Experts point out the following areas of responsibility: third-party involvement, biases, copyright infringements, security and privacy issues, source reliability and the need for regulations. Regardless of the collaboration with AI tools, human designers continue to take the responsibility of validating the work due to their distinctive judgment abilities.

The seventh Mode of Implication and hypothesis illustrates that the application of AI tools moves the packaging designer's role towards pushing boundaries and *Design Beyond the Status Quo*. While the extensive utilization of AI tools demonstrates the threat of producing predictable designs fueled by convenience, professionals stress the obligation of packaging designers to venture into new realms and sustain a strong commitment to creativity. Being involved in the creation of tomorrow's solutions, packaging designers not only have an impact on an individual perspective but also the ones of the consumers and the organization.

In conclusion, the study's results contribute to the theoretical understanding of the packaging designer's role with a special focus on SMEs by identifying seven Modes of Implications being caused by the utilization of AI tools. These modes include the strengthening of *Persuasive Visualization (1)*, their *Performance Amplification (2)*, enabling *Toolbox Expansion (3)*, reinforcing *Situational Adaptability (4)*, implying *Specialization Necessity (5)*, introducing *Validation and Risk Mitigation (6)* and lastly encouraging them to *Design Beyond the Status Quo (7)*.

8. Perspective & Future Research

8.1. Theoretical Perspectives

As the study followed an inductive approach, the results did not build upon existing theoretical frameworks. Nevertheless, it is fundamental to note that the identified Modes of Implications, which were also stated as seven different hypotheses, were analyzed in the context of already existing literature to delve into plausible explanations for a deeper comprehension of the thesis's findings and to look for additional explanations. The theoretical contribution of this study resides in the identification and delineation of seven distinct Modes of Implication emerging from the employment of AI tools in the packaging designer's role in SMEs.

Despite the limited availability of research especially referring to the junction between AI and packaging design, a variety of models within the sphere of AI have been applied to build links and bridge knowledge gaps. Particularly, well-established technology adoption and acceptance models, such as the Theory of Planned Behavior Model, the Technology Acceptance Model and the Technology-Organization-Environment Framework have been put into action to strengthen comprehension within the field. The seven Modes of Implication outlined in this thesis act as a practical application of these technology adoption and acceptance models, shedding light on the external factors that packaging designers experience when applying AI tools, their perceived value and the ease of utilization, all closely bound to the individual's adaptability. These models have formerly been confirmed as relevant in relation to packaging design, for instance, the adoption of digital software such as the Adobe programs, hence, showcasing their potential appropriateness in the realm of AI and packaging design. Moreover, due to the AI tool's main driver being the individual itself, these models are closely linked to the ways that the packaging designer's role change with the application of AI tools, including *Persuasive Visualization*, *Performance Amplification, Toolbox Expansion, Situational Adaptability, Specialization Necessity, Validation and Risk Mitigation, and Design Beyond the Status Quo*.

Furthermore, this thesis supports a more nuanced comprehension of packaging designers functioning within SMEs, as the present literature often is short of particular insights tailored to this specific company size. However, it becomes clear from various parts of this study that packaging designers are greatly impacted by their external environment, also comprising the type of company they work for. By building links between academic papers, the interview input that comes from packaging designers, and an expert interview with a data science consultant, this thesis establishes interrelations between these two subjects and delivers research within the realm of packaging designers in SMEs.

8.2. Managerial Perspectives

The outcome of this thesis is that AI tools have the ability to substantially reshape the role of a packaging designer, which not only provides implications for the individual but additionally demonstrates repercussions on an organizational level in SMEs. The interviews and literature review have brought forward the essential directive for businesses, especially those located in Denmark, a leading country in digitalization. The data science consultant in the interviews highlighted the demand for content creation businesses to proactively exercise commitment to these applications otherwise they fall behind.

The following figure visualizes the managerial implications and what actions can be provided by managers within SMEs to maximize the AI tool's potential within their packaging design teams. By now it should be clear that it can appear as advantageous and detrimental, which means that attention needs to be paid on its integration, thorough planning, preemptive measures, merits and drawbacks, offering a helping hand to the packaging designer and showing guidance on which processes are affected.

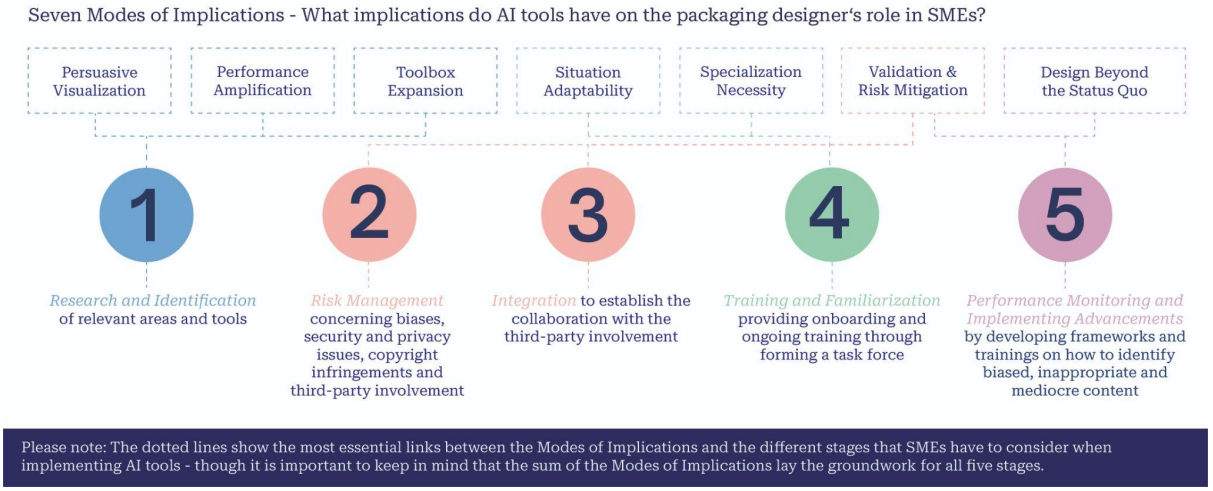

Figure 12: Visualization of Managerial Activities of SMEs that can foster the success of AI implementation, Source: Own creation

The first stage that needs to be taken into consideration from a business standpoint concerns proper *Research and Identification* of relevant areas and tools. While there is no doubt that the business can foster productivity and profitability by enabling packaging designers the AI applications and benefit from *Persuasive Visualization* skills, *Performance Amplification* and *Toolbox Expansion*, it is also of high importance to identify which tasks can be automated, which exact tools should be used, and evaluate the difficulties within the business AI tools can address.

As previously established, the packaging designer will take on the role of *Validation and Risk Mitigation*, another field where the organization equally assumes responsibility for driving initiatives in that field, summarized in the second stage, called *Risk Management*. As established in the thesis, there are numerous concerns going from biases, security and privacy issues, copyright infringements and third-party involvement - all aspects significantly demanding regulations within the field, going beyond the laws of GDPR and the Schrems II. The legal field of AI is due to its novelty a complex issue, which is why risk management should be the highest priority of companies, closely observing any future AI regulations, creating systems to ensure data security and developing risk management frameworks.

The involvement of third parties through making use of AI tools has been one of the biggest drawbacks according to the expert interviews, explaining why

businesses need to dive deeper into the third stage of *Integration*. In that context, all necessary mandates must be carried out, to establish the collaboration with the third-party involvement including setting up contracts to ensure data privacy and confidentiality.

Moving on, the Modes of Implications that referred to *Situational Adaptability* and *Specialization Necessity* symbolize how challenging it can be for humans to adjust to novel circumstances. Though, there are a few measures that businesses can undertake to help facilitate the process which can be found in the fourth stage called *Training and Familiarization*, where businesses have to provide onboarding and ongoing training by forming a task force within the companies that can work as mentors, motivators and a wellspring of inspiration. Content-wise it can be technical knowledge such as the right way of prompting information within data security, plagiarism and copyright infringement. The Data Science Consultant stated in the interviews that 70% of employees have not told their bosses about using ChatGPT, illustrating the utilization of AI tools as a bottom-up movement, but also emphasizing the organization's duty to communicate which data is allowed to be shared and which is not allowed to be used such as direct customer-facing processes or business-critical decision-making.

Considering the undesirability of a self-driven process, the next stage concerns *Performance Monitoring and Implementing Advancements*, where it is vital to observe and evaluate the AI-generated content and make necessary adaptations if needed. These processes particularly leverage the Modes of Implication concerning *Validation and Risk Mitigation* and *Design Beyond the Status Quo* as it implies the human has the role of verifying and ensuring that the quality is upheld to the utmost degree. This also requires the organization to provide the packaging designers with a framework and training on how to identify biased, inappropriate and mediocre content.

To conclude, if adopting a novel technology to its business and providing AI tools for in-house packaging designers it is essential to evolve from short-range planning to a focus on long-term goals. In the foreseeable future, following these steps, it would be interesting to observe if these measures have a

significant impact on workforce collaboration and overall employee behavior in SMEs, fostering a continual learning culture.

8.3. Future Research

The different Modes of Implications that outline the impact AI tools have on the packaging designers role leverage the understanding of the individual packaging designer on how to use these tools to their advantage, but also gives businesses, hereby, particularly SMEs, guidance on how it can generate value in their packaging design department and what they have to provide for a successful implementation.

The limitations of this study provide a solid foundation for further research, such as the demographic factors of age and nationality, by including Generation Z, baby boomers and the post-war generation and different nationalities. It would be insightful to open up the research to other countries and compare these, as packaging design is well-established craftsmanship and different from culture to culture. Furthermore, as the field of AI grows in popularity, it would be insightful to create longitudinal studies to identify and monitor modifications in the packaging designer's role over the years which are caused by the application of AI tools. With time more software will be launched giving a great opportunity to conduct some user experience research by actually testing a variety of AI tools and see how these impact the role of the packaging designer. Another idea would be to create a case study with an SME that has already implemented AI tools in the packaging design processes that sheds light on best practices, strategies and initiatives to foster AI implementation.

These are only a few examples but already show how much potential the area holds. Due to the lack of research within this domain, the researcher hopes that there will be additional upcoming literature about the utilization of AI tools within packaging design, simplifying a complex field.

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