

# **When Work Turns Into Play: How ideas conceived during leisure time make their way into businesses**

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## **Management summary**

Ideas and inventions generated during free time and proposed by employees can benefit the company in terms of new product innovation, process improvements, employee engagement and retention. However, there is no organized process model of how these employee-proposed ideas are implemented in enterprises, which inspires the research question: *How are leisure time inventions implemented in businesses?*

The resulting model of idea occurrence, idea forming, idea judgment and idea execution provide structure and clarity into this untapped area. Furthermore, management can approach these ideas in an organized manner and reap the rewards of a new or larger income stream or improved internal company operations. First, develop a work atmosphere that encourages employees to express their ideas and second, allow employees to experiment with company tools in their free time. Participating in a critical dialogue with employees about the presented concept may boost employee retention and job engagement. If rejected, proceed with caution since the reverse impact of retention and engagement may occur. If approved, negotiate the conditions, such as the wealth of resources, the budget, the number of employees, working hours, and supervision. Once the idea has been successfully implemented, promote it internally and reward the employee(s). The managerial impact of this study is to contribute to the successful adoption of leisure time inventions inside the firm and how to interact with them, since it has been discovered that LTIs can occur independent of position.

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**Keywords:** Leisure Time Inventions (LTIs), idea occurrence, idea implementation, user innovation.

## **I. Abstract**

Employee ideas and inventions have been shown to have a substantial positive impact on businesses. During most of the workday, the employee is focused on immediate tactical decisions, leaving little time to consider the wider picture of a problem. During leisure time, the employee may be able to reconsider and approach the issue from a different perspective or recombine knowledge and expertise. These suggestions result in new goods or services, or they could help the company improve its operations. These personnel should not be overlooked since they provide real-world, case-specific issues and recommendations with a high degree of dedication and championing that ordinary market research may lack.

This qualitative study develops a model of how these leisure time ideas are implemented inside the business by employing the critical incident technique during 18 interviews with employees of existing companies, and grounds this process model with the GIOIA methodology (Gioia et al., 2013). The findings reveal a process model describing the phases from idea occurrence to idea implementation with modification and approval propositions for future qualitative investigations. The practical implications allow organizations to approach these ideas by workers in an organized manner, perhaps resulting in a new or larger revenue stream for the firm and increased employee satisfaction. Employees who wish to bring in a concept they came up with in their spare time might learn how to approach management and boost their chances of acceptance. The significance of this study is that it advances the user innovation and leisure time invention literature by offering a previously untapped process model that provides a deeper understanding of the process as well as insights into how organizations approach and argue whether an idea is worthy of pursuing.

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*“Ideas and innovations always come from a sum of experiences that one has gathered. Where you get them from is always a question of history, a conglomerate of a compilation of all the experiences you have gathered. What is essential is when you were able to develop a culminating idea from it. That is, when you realised that you could combine these things you had learned in such a way that something new would come out of it. That happened very often, by the way, because during normal work one is relatively heavily involved in administration and yes, many activities that go on throughout the day, so that it is relatively difficult to come up with these free thoughts. The biggest, most interesting ideas that you can actually get come in the shower, while running in the woods, or during observations in your free time. When you deal with some problem and then find a relatively practical solution, which you then try to optimise or professionalise.” (Interview 9).*

## **1. Introduction**

Since the mid-nineteenth century, the amount of available leisure time has continuously grown (Poser, 2010), allowing individuals to devote more time to personal responsibilities and interests. During this downtime, people may ponder on current job responsibilities or produce new job-related ideas. Leisure time inventions (LTIs) are defined as the invention, “(...) where the main underlying idea for the new product or process occurs when the inventor is away from the workplace.” (Davis et al., 2009, p. 3). The leisure time idea may come to the inventor when he or she is engaged in a hobby, discussing ideas with friends, watching television, or taking part in a recreational activity (Davis et al., 2009). These leisure time inventors are often dismissed as hobbyists, and their inventions are brushed off as minor advances with little economic value, even though Bednorz and Müller’s Nobel prize-winning discoveries in superconductivity, the Wright brothers who pioneered the airplane in the early twentieth century, or Fry and Silver’s development of Post-It Notes at 3M are some examples of inventions that have evolved in multi-billion-dollar businesses or advanced society (Davis et al., 2009).

The example of 3M chemical engineer Arthur Fry, who was inspired to solve a work-time challenge given by his colleague Spencer Silver in 1974, illustrates this concept (Davis et al., 2009). Silver had created a non-sticky adhesive that had no practical application: “(...) a solution waiting for a problem to solve” (Davis et al., 2009; 3M, 2002, p. 38). Later, while singing in his church choir and becoming frustrated because his hymnal book markers were slipping out, Fry had an epiphany: Silver’s glue might be applied to scraps of paper to retain his position in the hymnal (Davis et al., 2009). Fry approached 3M management with the idea, but they saw no obvious application for it; they specialised in strong, not weak adhesives (Davis et al., 2009). Fry and Silver continued, both at work (using 3M’s “15% policy,” which allows workers to work on personal projects on company time) and at home (Davis et al., 2009). Fry constructed a prototype machine in his basement since 3M did not have equipment with coating equipment that could apply the glue to paper (Davis et al., 2009). He brought some to co-workers to try, and they loved them (Davis et al., 2009). 3M management eventually authorised the innovation for internal development (Davis et al., 2009). Post-It Notes went on to become one of the most profitable inventions of the late twentieth century (Davis et al., 2009).

This research investigates the notion of invention discovery and oftentimes also the development and proof-of-concept testing outside the firm during unpaid leisure time, which is then presented and commercialised within the company. It sets itself apart from traditional inbound research and development because it removes liabilities and biases such as groupthink or managerial constraints during the experimentation process (Davis et al., 2009). LTIs have their origins in the user-innovation literature. LTIs are comparable to "free innovation" in that they can both emerge during unpaid leisure time and are motivated by direct utility (Davis & Davis, 2007), but they differ from free innovation in that the purpose is solely for private consumption, with the intention of free diffusion and achieved with their own resources (von Hippel, 2017). LTIs distinguishes itself from other types of inventions because workplace creativity builds on the advantages obtained during leisure time and hobbies; and cannot be directly quantified by paid hours at work and often is unobservable and influenced by team and organizational dynamics (Davis & Davis, 2007; Davis et al., 2014; von Hippel, 2017).

The appeal of leisure time innovations stems from their capacity to advance technology while the creator is pursuing a passion (Davis & Davis, 2007). It is critical to extract ideas from leisure time since these ideas are based on genuine user tales and conditions. One may argue that alternatively, market research studies on requirements and demands of customers could be pursued, but they may lack the internal LTI idea champion to drive the idea past internal liabilities and barriers towards implementation. Moreover, promoting LTIs provides the inventor with a sense of purpose and affiliation to the organization in which they work. Purpose provides the innovator with a rationale why his or her invention matters (Pink, 2009). If the concept is approved based on the firm's requirements, the inventor feels a stronger connection to the organization, resulting in a higher degree of fulfilment and a lower chance of the employee leaving the firm (Davis & Davis, 2007).

On the other hand, employees that introduce a new concept with an unprepared managerial approach may result in the proposal being discarded, leaving the employee unsatisfied and perhaps departing the organization. In contrast, these ideas may benefit the company by offering new product developments or process, resulting in a new or larger income stream for the organization. However, there is a scarcity of literature on LTIs, and no model that describes the process of LTI implementation; therefore, the research purpose of this study is to propose a qualitative process model of how leisure time innovations arise, develop, and are implemented in organizations. The relevance of this topic is argued because, with a rise in accessible leisure time (Poser, 2010), the shift toward more knowledge-intensive work (Pink, 2009) and elevated levels of job satisfaction, the likelihood of stumbling onto an idea during free time is unavoidable. As a result, this study examines a significant source of knowledge that organizations may obtain, leading to the study's research question:

*How are leisure time inventions implemented in businesses?*

This research contributes to the literature and theory by presenting a model of how LTIs are incorporated in businesses, which is absent in the current literature. It builds on prior research by Davis and colleagues (2007; 2009; 2014), who have created the scientific foundation of leisure time inventions and how they emerged. This paper goes a step further and investigates

how these employees implemented their ideas within the company and provide structure in the fuzzy initial stages of innovation (Herstatt & Verworm, 2001). In addition to that, this study evaluates if these employees might be embedded lead users (Schweisfurth and Raasch, 2015) or if embedded lead users do not influence LTIs. This is suggested because embedded lead users actively participate in a community surrounding the company's products during their free time and may thus bring in these ideas. The type of network (Dahlander et al., 2014) to whom the notion is articulated is expanded to the LTI literature, as well as voicing ideas (Satterstrom et al., 2020) and idea championing (Howell & Boies, 2004).

Finally, the implication for practitioners is to establish a model for organisations to successfully incorporate LTIs. Managers who are aware that their colleagues are bringing in leisure-time inventions will have a more structured foundation on which to absorb and materialise these ideas. Moreover, LTIs can alter managers' perceptions of centralized R&D, allowing them to benefit from more diverse sources of information input and reconfiguration, as well as skill and passion. If accepted and executed well, LTIs may boost employee contribution, motivation, and identity with the organization; however, rejecting the LTI might have the opposite effect. Implementing the idea may also boost the employees' sense of self-satisfaction because of increased mastery and purpose (Pink, 2009). Additionally, the invention may contribute to a new revenue stream based on case-specific demand. Furthermore, inventive personnel may learn how to propose and develop their inventions based on prior learnings and recommendations from this paper. As a result, the approach becomes more organized, and the likelihood of internal exploitation increases.

To answer the research question, first, an overview of the theory is presented. Second, the research design, data collection, and analysis are discussed in greater depth. The model of this study is then presented and concludes with a discussion, implications for theory and practice, the limitations of this study and a future research agenda.

## **2. Theory**

The subheading structure inside the theory chapter follows the narrative about how the employee may discover the idea during leisure time, beginning with a general overview, individual attributes, the network, and the degree of embeddedness of the employee between the outside and inside of the firm. The conversation then switches to the theory of how to articulate the idea. And last, how the employee realizes the idea within the firm or through a new company.

### **2.1 Theoretical overview of creativity and leisure time inventions**

It is critical to distinguish between creativity, invention, and innovation to avoid a misunderstanding of these concepts. Creativity is concerned with the generation of novel and completely unique ideas (Patterson et al., 2009), which the inventor could need to start the leisure time invention. The formulation and further development of a novel idea is referred to as invention, the commercialization of an invention in the form of a new product, method, or service is referred to as innovation (Davis & Davis, 2007). Traditionally, manufacturers have

been thought to spend in product and service development to market their inventions (Gambardella et al., 2017). Over the previous three decades, individual user innovation has progressed from being seen as an aberration to being acknowledged as an activity carried out by many millions of users that results in the production of numerous personally and economically significant new goods and services (Gambardella et al., 2017). LTIs are a subset of the user innovation literature that focuses on idea generation outside of the firm's boundaries and idea exploitation within the firm, whereas user innovation can be formed and performed outside the firm (von Hippel, 2017).

LTIs are inventions, "(...) where the main underlying idea for the new product or process occurs when the inventor is away from the workplace." (Davis et al., 2009, p. 3). Leisure time inventions incorporate innovative work that occurs outside of the domains of the company, for which the inventor receives no income or compensation (Davis & Davis, 2007). Leisure time is defined as time spent when an individual is not working or performing duties, which are also referred to as obligations such as eating or sleeping, it is also characterised by an individual's ability to have a choice of what form of leisure to pursue (Kelly, 2012). Poser (2010) explained that leisure time: "(...) provides a framework for a very wide scope of individual leisure activities: from pro-active to passive pursuits; from personal productivity to ostentatious consumption; from relaxing, quiet activities at home such as reading to making music and attending and/or throwing (...) parties; from indoor activities such as watching TV or playing computer games to going to restaurants, fairs and museums; and, finally, from shopping and participating in outdoor sports to space tourism." (Poser, 2010, p. 1). One of these choices can be personal hobbies, which are described as activities performed on a regular basis during one's free time for enjoyment (Davis et al., 2014). According to Davis and colleagues (2014), leisure time in general and hobbies in particular, can affect creativity in three ways. First, employee innovators may be able to use abilities learned while pursuing a hobby, such as a disciplined approach to problem-solving, to work-related issues (Davis et al., 2014). Second, they may have access to external information sources that are not available during working hours, which they might combine with workplace expertise to develop important inventions (Davis et al., 2014). Third, employees may profit indirectly from hobbies since leisure activities have been demonstrated to have a vital role in the development of cognitive skills, particularly two cognitive special abilities: the ability to analogize and the capacity to participate in divergent thinking (Davis et al., 2014). As a result, creativity may be viewed as a key precondition to developing an LTI.

If the hobbies and tasks conducted in their free time may appear unappealing, one may feel bored, which may be a major source of creativity during leisure time. Boredom is caused by a scenario in which none of the conceivable activities that a person can do really appeal to the person in question, which causes the person to become sedentary and usually dissatisfied (Mann & Cadman, 2014). Boredom allows the mind to wander and find creative fresh solutions (Mann & Cadman, 2014). Boredom is seen unfavourably by most people, and with today's technology which allows the brain to attain rapid pleasure, the brain is always consumed (Baird et al., 2011). While this feels good, it limits the ability to rethink our lives for the better, be more creative, and consider novel solutions (Baird et al., 2011; Mann & Cadman, 2014).



According to one study, the more bored people are, the more creative their ideas become (Mann & Cadman, 2014). In addition to hobbies, this source of creativity might result in innovative ideas that the employee can propose to the company. Consequently, boredom can lead to creative ideas, which can lead to the production of ideas or inventions for the firm.

In addition to the activities, or lack thereof, during leisure time, individual characteristics and the connected network may also be related to creativity. One group contends that creativity may be discovered in the inventor's personality, capabilities and activities (Frosch et al., 2015; Schweisfurth & Raasch, 2015; Schweisfurth & Raasch, 2018; Zwick et al., 2017), another group contends that creativity may be discovered inside an individual's network (Baer, 2010; Dahlander et al., 2014; Granovetter, 1973). The two sections that follow address these points of view regarding leisure time inventions.

## **2.2 Individual attributes**

Not only the type of leisure activities but also the individual attributes might influence the degree of creativity and inventiveness. Zwick and colleagues (2017) conducted a study in which they used the "Knowledge, Skills, Abilities, and Other" (KSAO) model, which is recognized as a comprehensive framework for capturing productivity-relevant individual characteristics to extract inventive attributes. The researchers discovered that a high educational level, a high proportion of R&D-intensive work, a systematic and intuitive cognitive thinking style, divergent thinking abilities, openness to new experiences, and a positive risk attitude are all strongly associated with creative performance (Zwick et al., 2017). Frosch and colleagues (2015, p. 1) add: "(...) inventor characteristics that have been largely overlooked in previous studies on inventor productivity, such as work experience breadth, divergent thinking skills, cognitive problem-solving skills, the use of knowledge sourced from networks within and outside of the inventors' field of expertise, and personality traits.", and concludes that these: "(...) characteristics double the proportion of total variation in productivity explained by individual inventors." (Frosch et al., 2015, p. 1). Therefore, these attributes were associated with higher levels of creativity, which the inventor needs as a prerequisite for developing an invention.

With today's knowledge-intensive professions, the traditional carrot-and-stick approach of encouraging good behaviour and discouraging poor behaviour does not work (Pink, 2009). Daniel H. Pink discovered in his book "Drive: The Surprising Truth About What Motivates Us" that for knowledge intensive or creative work, people perform best when they sense autonomy, mastery, and purpose (Pink, 2009). Autonomy refers to self-direction and the sense of self-determination; mastery refers to the sense of getting better at things that matter; and purpose refers to knowing why I am doing something (Pink, 2009). Mastery, in particular, might be a cause why an individual begins working on projects in his or her spare time; it is the desire to learn about a subject, mastering it, and perhaps discovering new ways of doing, producing, and developing.

### **2.3 Individual network**

The inventor's network and how strong or weak these relationships are to the other members may also have an influence for creativity. According to Baer (2010), actors were most creative when they maintained a weakly connected but diverse idea network. Networks saturated with "weak" ties, social relationships characterized by infrequent interaction, concise history, and limited (emotional) closeness, are particularly valuable to the production of creative ideas because they allow for enhanced access and exposure to socially distant pockets of information—information that is likely to be novel and, thus, likely to spur the combinatory process underlying the production of creative ideas (Baer, 2010; Granovetter, 1973). Strong ties are usually connected with high degree of specialisation on a specific topic, which are beneficial for the further development and commercialization within the company at a later stage (Baer, 2010). As a result, while shifting from outside to within the organization, the inventor may need to shift their network emphasis.

The creator of the LTI may communicate with customers or clients of the company's product in their leisure time by engaging with family, friends, or acquaintances. According to Dahlander and colleagues (2014), extensive engagement with outside knowledge sources has been shown to boost inventiveness; yet the same level of inventiveness has been observed in employees who exclusively focus on internal resources. The effectiveness of creativity relying on family and friends has been shown to be extremely beneficial for non-creative personalities (Madjar et al., 2002). However, this impact has been contested, with contradictory findings in a study by Paramitha and Indarti (2014), who discovered that assistance from co-workers was more advantageous compared to family members. One may argue similarly to Dahlander and colleagues (2014), that external information sources such as family and friends and internal knowledge sources such as co-workers, can provide equivalent degrees of creativity, but this could strongly rely on the context of the topic and expertise of the members.

### **2.4 Embedded lead users**

These innovators may also be product clients of the company where they work because of their strong interest in the firm's activities and because they contemplate about and use the product in their leisure time. Embedded lead users (ELUs) can be defined as “(...) employees who are lead users of their employing firm's products or services.” (Schweisfurth and Raasch, 2015, p.168). Lead users are those whose current, pressing requirements will become commonplace in a market months or years from now (von Hippel, 1986). Because lead users are familiar with situations that most others will face in the future, they can function as a need-forecasting laboratory for marketing research (von Hippel, 1986). Furthermore, because lead consumers frequently try to meet a demand, they can contribute fresh product concept and design data (von Hippel, 1986). ELUs are beneficial for the company because they can absorb tacit need knowledge, which refers to unsatisfied needs that arise because of the use of a specific product or service, from the user domain and then acquire, disseminate, and utilise this information for business innovation that may arise in their leisure time (Schweisfurth & Raasch, 2015; Schweisfurth & Raasch, 2018). Solution knowledge, in addition to need knowledge, refers to the ability to solve technological difficulties and provide functionality (Schweisfurth & Raasch,

2018). If both forms of information are accessible in an organization and there is a good fit between the two knowledge sets, they can be merged to generate innovation (Schweisfurth & Raasch, 2018). These ELUs may also have a large network of devoted community members who have suggestions or concerns that the ELU might grasp during leisure time and propose.

## **2.5 Voicing ideas**

Following the emergence and/or limited development of the idea, the inventor might speak up and offer the idea to his or her management. Employees' discretionary presentation of constructive suggestions for enhancing organizational or unit performance to those in charge is a critical conduit for valuable ideas to reach decision makers (Satterstrom et al., 2020). Employees feel most at ease expressing and speaking about their ideas when they believe their management to be open, approachable, non-abusive and willing to act (Burris, 2012; Satterstrom et al., 2020). However, power imbalances between voicers and those with the authority to put their ideas into action can drive voicers to be reluctant to speak up for fear of negative career implications such as being perceived unfavourably and obtaining substandard performance ratings (Gernreich & Knop, 2020; Satterstrom et al., 2020), which may discourage otherwise brilliant ideas. Inventors can improve the likelihood of their idea being chosen and reduce a negative image, by framing ideas in a more desirable manner to authority holders, such as presenting ideas as opportunities for the company to expand (Gernreich & Knop, 2020; Satterstrom et al., 2020).

Knowledge sharing can be classified on a spectrum being either tacit or codified (Edmondson et al., 2003; Zahoor et al., 2021). Tacit knowledge, also known as know-how, is difficult to describe and is gained through experiences, as well as being anchored in action or is context-specific (Edmondson et al., 2003). Codified knowledge, also known as know-what, relates to formal, symbolic language-transmittable knowledge (Edmondson et al., 2003). It is crucial when transmitting tacit information since it is typically transferred through proximity and human contact, explicit information can be more easily conveyed to others in written form (Edmondson et al., 2003). It is also vital to consider how supervisors react to voice and the consequences thereof. Wu and colleagues (2021) discovered that supervisors' voice approval favourably promotes workers' voice behaviour and job performance via the mediating effects of pleasant mood and work engagement. Some firms offer an innovation competition program that encourages employees to pitch their ideas to a board and have them voted on by their co-workers for realization and implementation. While these programs may encourage employees to express their ideas more openly since they have the chance to do so, the objective for this study is primarily if these proposed ideas or innovations are truly founded within leisure time activities, which may not always be the case in these kinds of programs.

## **2.6 Idea championing**

However, simply discussing and sharing information about the LTI with others does not realize its prospects. Therefore, an idea champion must actively and enthusiastically support the LTI through critical organizational phases (Howell & Boies, 2004). Idea champions show personal dedication to the idea or invention, and promote it with passion, tenacity, and enthusiasm

(Howell & Boies, 2004). Idea champion initiatives has already been observed when employees identify with the firm they work for and find meaning in their profession (De Clercq & Pereira, 2020). The employees' active championing of novel ideas may benefit not only their employing organization but also themselves, potentially expanding their network of intra-firm relationships, revealing in-depth insights into organizational decision-making processes, and earning them higher performance evaluations or a greater sense of personal accomplishment (De Clercq & Pereira, 2020). Persistent lobbying efforts, on the other hand, might be difficult for idea champions, especially when other organizational members may feel intimidated by the proposed changes or fear losing their present advantages (De Clercq & Pereira, 2020). If they can advocate and express it to management for possible internal exploitation, their idea will take off and be effectively adopted.

## **2.7 Internal exploitation**

Strong emotional attachments or investments in the emerged invention might make overcoming cognitive biases much more difficult. It is therefore critical that the innovator keeps a realistic and objective perspective on his or her invention and does not overstate the hoped-for effect (Zvereva & Kozlov, 2021), to be evaluated and chosen for further development and exploitation. There can be many reasons for a company to accept or reject an idea for exploitation. For example, in the 3M case, 3M has previously conducted extensive research and accumulated a large amount of knowledge about adhesives, therefore discoveries more directly tied to their adhesive business may have a higher chance of acceptance than inventions based on different knowledge areas. Furthermore, the extent to which new knowledge is necessary for exploitation of the innovation may reduce the possibility of acceptance, because acquiring new knowledge may be associated with risk, which the business could avoid if knowledge within the firm is already established or can be built upon. Additionally, the future market prospects may be uncertain, adding another element of risk and decreasing the possibility of adoption.

If the company is willing to pursue the LTI after the presentation, the company must have absorptive capacity skills to integrate this invention into the organization (Ramayah et al., 2020). Absorptive capacity (knowledge acquisition, dissemination, and utilization) is seen as a critical organizational competency for recognizing the value and assimilation of both external and internal information to improve business innovation (Ramayah et al., 2020). There are several reasons why a corporation may accept or reject a leisure time invention, including the value prospective customers see in it, market size and the current market situation, capacity to produce and sell at a profit, degree of familiarity with the idea, and many more discovered through interviews.

## **2.8 New venture**

Pursuing the Leisure time invention through an independent venture necessitates the development of entrepreneurial characteristics and competences, which may be risky and unrealistic for many people. As an intrapreneur, being able to exercise these entrepreneurial

traits within an established firm as an employee with appropriate resources and capital makes the idea implementation process achievable (Baruah & Ward, 2014; Gawke et al., 2019). As a result, one approach of developing the LTI is through the availability of intrapreneurship within the firm; yet, in highly structured organizations, such employee independence is not always available (Baruah & Ward, 2014; Gawke et al., 2019). Furthermore, intrapreneurship is not a feasible choice for limited product or process improvements but requires a standalone new product or service. This causes inventors to present their ideas to their management, who then decide and take over the invention and realize it internally.

In addition, the German employee invention act (Deutsches Patent- und Markenamt, 2009) prohibits the pursuit of the innovation under a work contract, and the invention must be declared to the employer regardless of the origin of the idea (at work or outside of work) and if the idea is related to the businesses of the firm or not. In the Netherlands, the same laws apply; however, if the employee is recruited for a task other than research and innovation, but nevertheless develops an invention, the patent right is transferred to the employee (e.g., an accountant who makes an invention in robotics) (Netherlands Enterprise Agency, 2021).

In the United States of America, unless a contract states otherwise, employers are typically entitled to any intellectual property developed at/for their firm (The United States Patent and Trademark Office, 2021). Even if the firm rejects the idea, as in the 3M incident above, the company keeps ownership of the invention under the laws. Given Fry's position as a chemical engineer, in which the employee is merely performing his or her job: generating a better process or product for the company (US Chamber of Commerce, 2021), this just happened outside of the working hours. As a result, independent pursuit of the idea is prohibited, and legal counsel must be obtained in different jurisdictions not discussed above if the employee insists on an independent venture. This might also be clarified by investigating the firm's employment contract or personnel policies and the position the employee is hired for.

### **3. Research design**

To answer the research question, a suitable research design must be employed. The use of a qualitative research approach is justified because it permits questions to be posed and underlying causes to be uncovered; the nature of this qualitative research is exploratory (Orbuch, 1997; Woolsey, 1986). The primary goal is to study how LTIs are adopted in organizations, and the responses from the 18 critical incident interviews will be used to create a model that illustrates this process. In the following section the selection, sample, data collection and analysis are explained in further detail.

#### **3.1 Selection and sample**

Employees of a firm who have applied their idea in the company were selected as interviewees. The participants were chosen by contacting my personal network and companies whether they were aware of any LTI incidents. Employees who have implemented their idea within the organization were chosen because they can better recall their prior experiences and can illustrate the LTI implementation process in more depth compared to managers, colleagues or

other spectators. The sample consists of 18 semi-structured interviews with the inventor of the LTI, from moderate to large-sized organisations (50-249 or >250 employees) in different industries. Examples of implemented ideas encompass robotics, augmented reality, and the internet of things, but they might also be products/services/software based on current products/services/software, wholly new products/services/software, or process enhancements. While most of the sample consisted of successfully implemented ideas because that is the purpose of the study, a few cases of LTIs that were rejected are also included. The supervisor of this study offered a data set including 15 transcripts of interviews with LTI inventors to supplement the primary findings. These interviews were performed in 2015 and were frequently recorded in German before being translated into English for use in this study. Moreover, they were reviewed for coherence to see whether they would fit for this research, therefore entrepreneurs who are self-employed and introduced their concept into their organization were excluded. Because only employees who have implemented their LTI in businesses were chosen, this sample accurately represented the population, and there is little to no incompatibility. Table 3 in the appendix summarizes the various roles, leisure activity, and consequent invention type.

### **3.2 Data collection**

Besides drawing on key concepts and information from scientific literature from various online journals accessible on Web of Science and Elsevier for the theory section above, primary qualitative research in the form of critical incident interviews was conducted to answer the research question: *How are leisure time inventions implemented in businesses?*

According to Flanagan (1954, p. 338) “(...), an incident is critical if it makes a 'significant' contribution, either positively or negatively, to the general aim of the activity and it should be capable of being critiqued or analysed”. The critical incident technique (CIT) in the form of critical incident interviews was chosen because it allows the focus to be on a narrative (Gremler, 2004), which in this case is the instances of the inventor having a novel idea in his or her spare time and bringing it to the company. The critical incident approach has limitations in that it provides a subjective perspective on organizational challenges (Serrat, 2017). Individual perceptions, memory, honesty, and prejudice all influence behaviour reports, which means they may not be entirely accurate (Bott & Tourish, 2016; Serrat, 2017), reducing the general reliability and validity of the data. One method applied for increasing the data's reliability and validity included recommending that the interviewee reflect about the occurrence before the interview. This enables the interviewee to precisely consider the activities and reduces the possibility of losing possibly vital details when recalling during the interview.

Personal tales provided by participants, on the other hand, are not just fabricated or unusual representations of limited utility for theory formation (Schilpzand et al., 2015). More crucially, Orbuch (1997) maintains that narratives may be an excellent instrument for understanding processes, providing deeper, more complex, and consequently more accurate information than standardized surveys in some circumstances (Schilpzand et al., 2015). Storytellers are assumed to record the most significant story parts and sequences when describing an event, which has

been suggested to be a primary strength of narrative-type data in constructing process theories (Schilpzand et al., 2015). According to some academics, employee narratives are the greatest way for developing theories since they effectively represent organizational behaviours, procedures, and structures (Schilpzand et al., 2015). The recorded, anonymized, and transcribed interviews will be used to gather more information about the implementation of the leisure time invention in the firm.

### **3.2.1 Agenda for the interviews**

For this section, the book by Newcomer and colleagues (2015) was used for structuring a semi-structured interview. Semi-structured interviews were chosen because they are adaptive to each individual and the story they tell. The interviews' purpose is to encourage respondents to explain and talk about their actions, feelings, and the whole story from developing to implementation. Because respondents were usually eager storytellers and generally highly enthusiastic in their field of expertise, they were not stopped while answering an interview question before it was asked. In contrast, more introverted people were less communicative, thus having a list of questions to go through came in handy.

To conduct a semi-structured interview, the first step is to develop a list of open-ended questions (Newcomer et al., 2015). During the interview, participants were first informed for permission to record and then instructed to focus on the recent event in which they had participated or witnessed first-hand experiences and actions to offer thorough and accurate answers about how they implemented the LTI (Hughes, 2007). They were also urged to present factual descriptions of what occurred rather than judgments (Hughes, 2007). The illustrated format of the interview and questions to guide the interview are shown in Table 1; each interview lasted between 30 to 40 minutes.

**Table 1: Sample interview questions as an example interview format**

- Welcome section (Warmly greet them, express gratitude for their involvement, demonstrate that their information is valued, explain the structure and expectations from this interview and request permission to record).
- Please explain how the LTI occurred and how you formulated the LTI from your perspective.
- What was the internal company situation which might have kick off the idea exploration stage of your/the invention?
  - On what basis was your idea based? (Company need, customer want, etc.)
  - Why do you think this was innovative?
- How did you produce the potential solution?
  - Did you use the product/service from the company in your free time?
  - What leisure activity did you do when you produced the potential solution?
  - Were colleagues involved in the leisure activity?
  - Did your network have an influence in the idea development and in what way?
  - How did you create the idea in the form of a prototype?
- How did you pitch the idea to the company?
  - What was the reaction of the people you pitch your idea to?
  - What were the barriers which hindered your proposal and why?
- Was the LTI incorporated into the firm?
  - How did you do that?
  - What methods did you use?
  - What resources did you use?
  - What went well and what did not go well?
- Closing section (Thank the interviewee for their time and ask for further contact people for this research).

### **3.3 Data analysis**

Once the stories (critical incidents) have been gathered, the content of the interviews are analysed. To derive from the transcribed interviews towards a model which explains the LTI implementation model, the inductive qualitative GIOIA method was applied (Gioia et al.,



2013). The GIOIA technique starts with first-order concepts (emergent themes) that try to stay true to informant terms while making minimal effort to distil categories (Gioia et al., 2013). As the study develops, emphasis is placed on the similarities and contrasts throughout the respondents (Gioia et al., 2013). The emergent constructs in the second-order analysis give notions that may help to characterise and grasp the events observed (Gioia et al., 2013). Once an appropriate set of themes and concepts has been established, then it is possible to further compress the 2nd-order themes into aggregate dimensions (emergent umbrella categories) (Gioia et al., 2013). The aggregated dimensions are then formed into a model which explains how LTI develops and is implemented in the firm. To avoid misunderstandings between the software and the spoken text, the audio was matched with the text to refine and validate the transcribed text. Atlas.ti and MAXQDA software aided in the management and coding of qualitative data, as well as the GIOIA technique described above, which was subsequently used to visualize the data. Figure 1 and Table 2 show how narrative segments from interviews were categorized into constructs.

### **3.4 Ethical processing of the data**

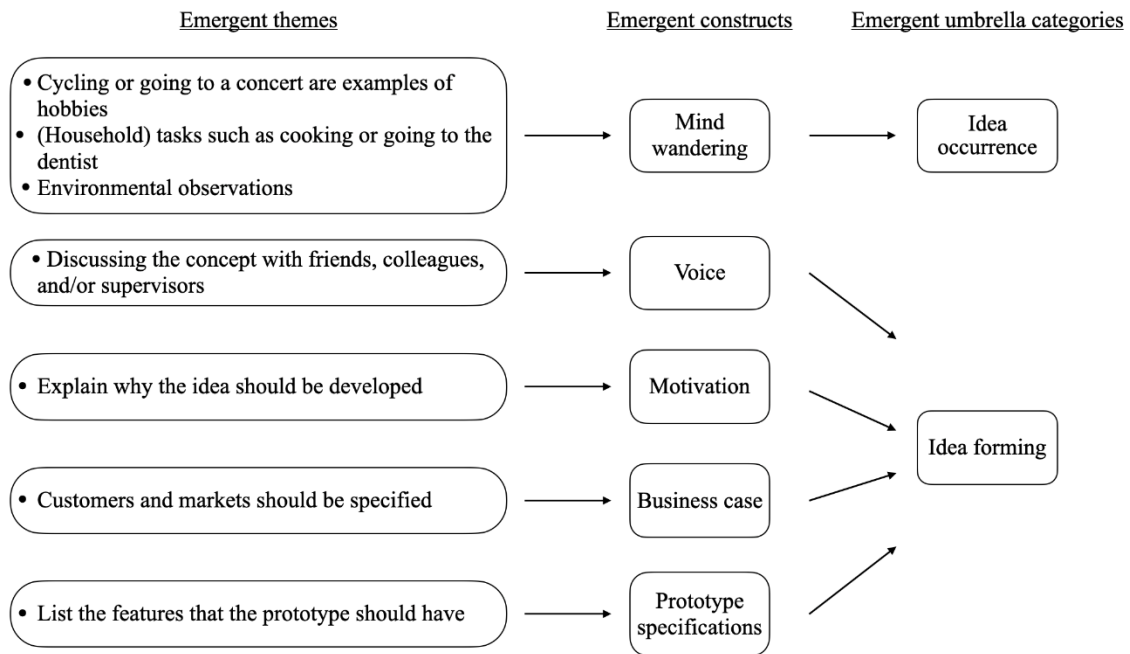
Because participants are intimately involved in various stages of the study, interactions between researchers and participants might be ethically difficult for the former (Sanjari, 2014). As a result, it appears that developing specific ethical norms in this area is crucial (Sanjari, 2014). The interviews were recorded and stored digitally. Data storage was handled using the University of Twente account and Microsoft OneDrive cloud service. The raw data and audio recordings were only accessible to the supervisor and the author of this study. They will not be shared with third parties unless the respondents provide explicit authorization. Subject-identifiable recordings are properly controlled and discarded as soon as the investigation's interest allows. The data for research reports and publications is anonymised. Importantly, this study meets all the requirements set by the University of Twente's Ethics Committee.

## **4. Results**

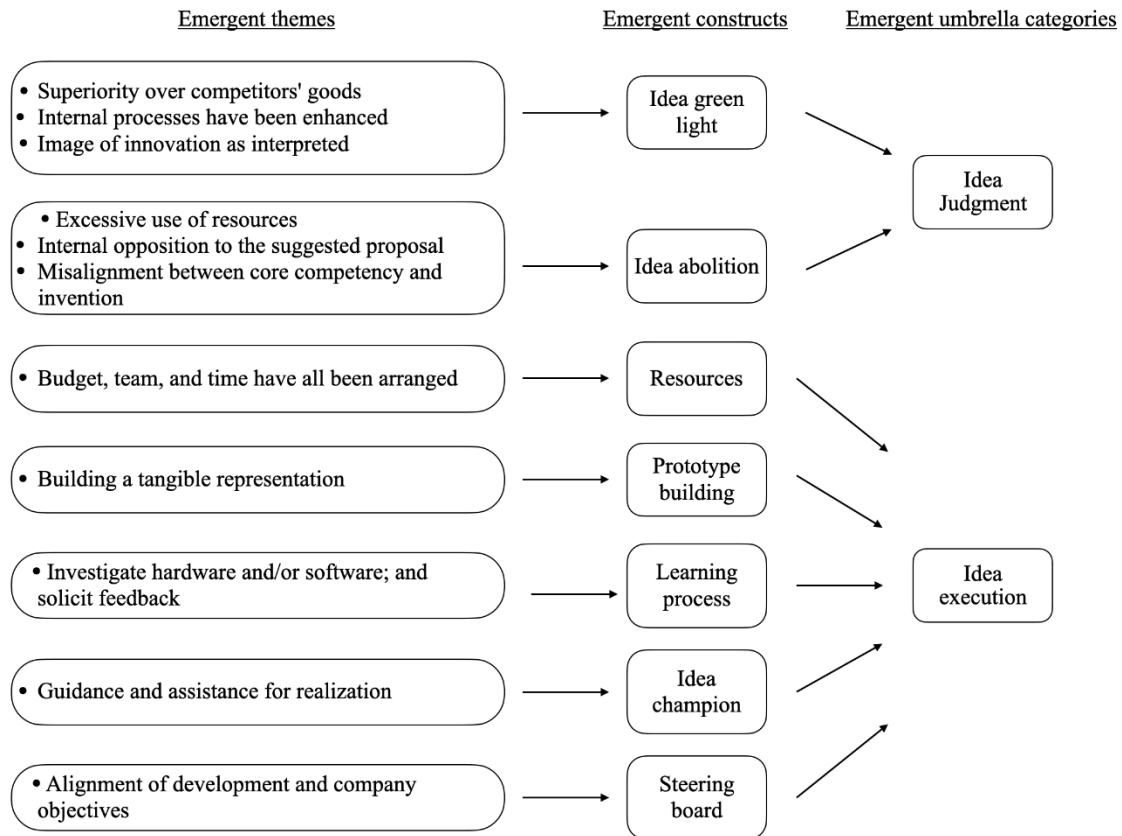
### **4.1 Overview of the findings**

The key themes and constructs that emerged from respondents' recollections of the LTI implementation process are depicted in figure 1. Table 2 depicts how the quotes were converted into themes, which were then developed into constructs. Each incident began with an idea discovered during their leisure time, which sparked the process. The following themes, constructs, and umbrella categories provide structure and foundation for the conceptual model that emerges from the data. Figure 2 depicts the unfolding model, which will be used as an organizational framework to describe the findings. As seen in the illustration, when an idea is materialized, it becomes an invention, and (if applicable) when it is commercialized, it becomes an innovation.

**Figure 1: Emergent key themes and constructs in the development of leisure time inventions within businesses**



**Figure 1: Emergent key themes and constructs in the development of leisure time inventions within businesses (continued)**



**Table 2: Coding process illustrations**

Quotes	Themes	Construct
"Naturally, even before I entered the industry in 1988, I was always on the road in the amusement parks and was interested in that, and then I rode a roller coaster for the first time in America (...)" (Interview 6)	Hobbies	Mind wandering
"(...) and that took place as you can easily imagine at Christmas time that I found that it is incredibly difficult with a long chain to decorate the Christmas tree at home (...)" (Interview 4)	(Household) chores	
"I noticed two things from my own family alone. One was the need for supportive mobility in my own parents - I don't need to read studies for that, I just need to observe what happens in my family." (Interview 9)	Observations	
"(...) when I came across this idea, I pitched it to a couple of guys from work." (Interview 1)	Discuss with colleagues	Voice
"The owner of the company, who is 2 years younger than me, also had the thought process already (...)" (Interview 6)	Discuss with supervisors	
"But pretty early or actually through the whole innovation - also for the other idea - I skyped a lot with 3 friends from my university - fellow students with whom I was in Scotland and lived with." (Interview 7)	Discuss with friends	
"When you hold the presentation in the second round, communicate why the company has a good value out of it." (Interview 7)	Reason for realization	Motivation
"Of course products but but also market(s) and knowing how to sell (...) so that's the base of the the business case (...)" (Interview 1)	Customers and markets	Business case
"I want to have electronics in it. I want to make it self driving." (Interview 1)	Features of the prototype	Prototype specifications
"And it's clear that if we can do that, then we would have a unique selling point, and then of course we could stand out from the market." (Interview 6)	Competitive advantage	Idea green light
"And also people are just coming to me like: "Hey, I've seen your story in the newspaper, sounds really interesting and that's why I am now applying at (company name)". So, yeah, you could really see this as, even though the product itself is not "Sure, we are in our "just-in-time" concept, which means we have a certain amount of time and of course we have to produce a lot of output (...) and if that goes faster with the [Invention], well, I think every side benefits from that. "	Perceived innovativeness of the company Enhanced Internal processes	
"Well I personally think that they don't put it in practice. Just because of the costs." (Interview 7)	Costs	Idea abolition
"The barriers are the distribution channels and the service. These are electronic devices and we are a [Name of the industry] here. There are no electronics technicians here in the house who can repair such things, who can handle them. At	Mismatch between core competence and new invention	
"Here you have a small budget, start working on something that you can present." (Interview 1)	Budget	Resources
"(...) the whole technical story went through the design manager, who then involved his guys accordingly, but in the end there were only a few contact persons, so the sales department, for example, was there at the beginning and said, great, if	Team	
"You can spend something like 16 hours (...) and at the end of three months, you present the results." (Interview 2)	Time	
"The first prototype I presented were just a couple of [Name of company] bowls. Stick together with an outer shell so it could rotate, and it's sort of look like this. How it eventually should look like." (Interview 1)	Physical representation	Prototype building
"And the student was able to kind of figure out more about hardware and software and the platform needed to generate software for (product name)." (Interview 2)	Study hardware and/or software	Learning process
"A concrete advice was... (thinking) ... to focus on the costs. And 'what is the benefit for the company?'" (Interview 7)	Feedback	
"And what I also did during this period, I installed a kind of steering team with experienced people from electronics and software. (...) So this steering team was guiding the engineers (...)" (Interview 3)	Guidance	Steering board
"I think never give up and try to realise your visions somehow. "There's no such thing as can't". So there is always a possibility. Keep at it." (Interview 8)	Visionary	Idea champion
"My boss supported me the most, because he was also enthusiastic about the idea (...)" (Interview 16).	Support	

## 4.2 Building theory from LTI implementation stories

A few similarities were discovered among the responders. Throughout the interviews, it was apparent that these employees cared about their jobs and brought home challenges and thoughts.

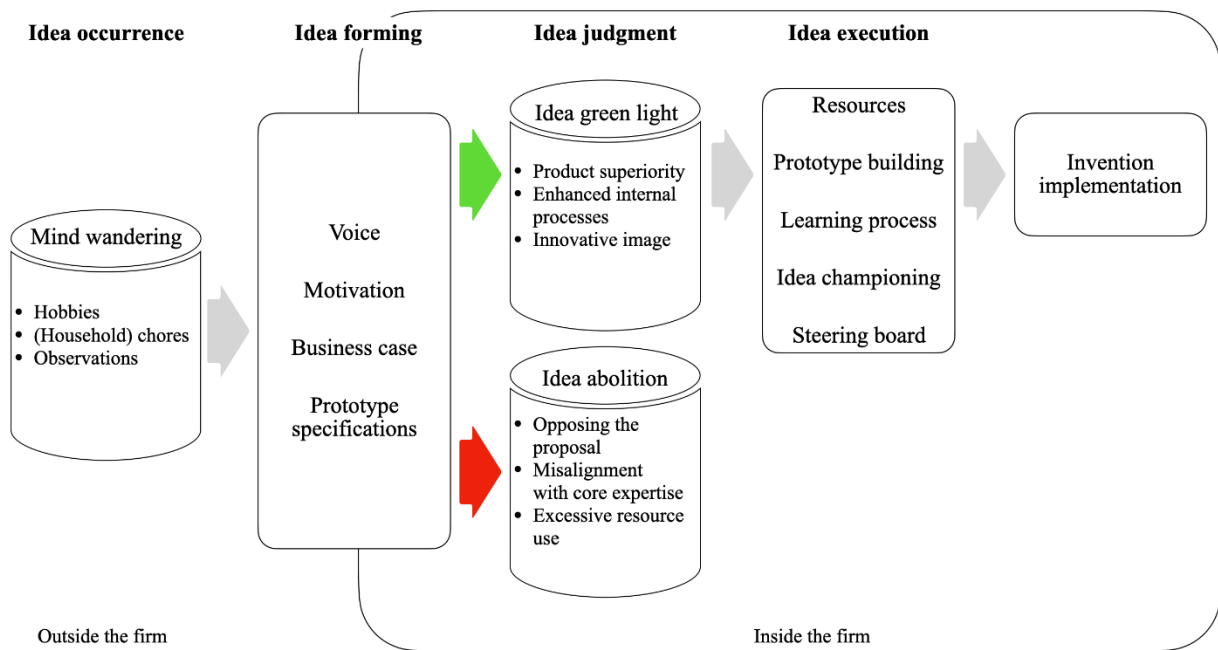
*"Well, I'm the type of person who doesn't just leave the task from work alone when I go home. When I have a problem, or when I have to solve a task, it's actually with me all the time. And then I walk through the world with my eyes open."* (Interview 18).

Hobbyists were also part of this sample.

*"But in your free time you also work with methods and tools that support your own work ability and quality. This is the keyword of lifelong learning; one deals with new things that one then out of interest looks at, (...) tries out and applies during work or completes what one has seen (...) in one's free time."* (Interview 10).

It was also discovered that the position had no direct effect on the likelihood of an LTI forming, as shown in table 3 in the appendix. The sample included student trainees to consultants, to the head of a mechanical design team. The observed path from the moment the idea emerged to implementation inside the company is described in the next section, and propositions are formed.

**Figure 2: Process model of incorporating leisure-time inventions into businesses**



#### 4.2.1 Idea occurrence

According to the interviews, an idea occurrence phase must first emerge, which in this context is during their leisure time. The first construct is mind wandering, which involves the employee linking information in new ways to generate innovative ideas. Three types of themes within the mind wandering construct have been observed, which are: hobbies, (household) chores and observations. One way employees occurred an idea was through hobbies. The hobbies varied from active (such as cycling or mountain climbing) to passive (i.e., listening to classical music at the orchestra or watching a movie). One respondent mentioned how, while cycling to clear one's mind, a novel approach occurred suddenly.

*"(...) and then, while cycling, I actually had the idea of how we could do it. It's a classic, you cycle a bit to clear your head. You think about where you're going now and review the day in your head and then: "Hey, why don't we do this, this way and that way?" So, it's a flash in the pan, so to speak, and then a bit of a brainstorm develops about how I could implement it (...)" (Interview 14).*

Another respondent elaborated on mind wandering when engaging in a passive activity such as listening to classical music.

*"(...) I thought to myself, you have to be able to do something like that mechanically, and yes, that's always been floating around in my head, and we had a subscription for classical*

*music back then, and I often went to the Gasteig, and then you surrendered to the music, leaned your head back, and that's when your brain started to work.*" (Interview 5).

One employee was inspired to come up with an idea after seeing a movie with a friend.

*"(...) I was going out with a friend once in the evening, we watched a film in the cinema, I think it was Avatar, and it was like this, where the people somehow wear robot suits and fight with them and then I thought to myself, my God, why don't I have something like that in the company?"* (Interview 15).

Furthermore, (household) chores like cooking, decorating the Christmas tree or going to the dentist were also a cause of mind wandering. One participant recounted their cooking experience and related it to their overall leisure and work time.

*"(...) it's kind of being in the laboratory, except you're in the kitchen. You don't want to blow something up and you want it to taste good. But you focus away from it. And you don't know what triggers it, but it's a priority in your head for some reason it has to do with work, but somewhere you are only at work a third of your time or less. Two thirds of your time plus six weeks of vacation, plus 13 holidays, plus bridge days, plus weekends. You're likely to come across this solution sometime outside of work, especially if it's a priority thing."* (Interview 13).

While decorating the house for Christmas, another respondent had an idea.

*"(...) I realised that it is incredibly difficult to decorate the Christmas tree at home with a long chain and I thought to myself: it should be easier somehow (...)"* (Interview 5).

Another employee's mind wandering was caused by personal errands such as going to the dentist.

*"(...) it was a tool that I could realise in the company and the idea actually came to me at the dentist."* (Interview 18).

Finally, observations constitute a third type that has resulted in mind wandering.

*"I noticed two things from my own family alone. One was the need for supportive mobility in my own parents - I don't need to read studies for that, I just need to observe what happens in my family."* (Interview 9).

Mind wandering has been observed as an effective tool for reflecting on and recombining prior events or information. The reason mind wandering acts as a tool for reflection and recombining events is because employees can take a step back and assess the wider picture of an issue or how to handle an issue because of their distance to the firm during their leisure time. The leisure activities of the questioned employees resulted in mind wandering activities, which led to the formation of the first proposition.

*Proposition 1: Hobbies, (household) chores or observations lead to mind wandering.*

Mind wandering can have a variety of consequences, some of which may be meaningful to the organization where the individual works. Not every idea that comes to mind in one's leisure time is feasible or practical, though some are. When the mind wanders and leads to a fresh concept for the firm, it becomes a valuable opportunity during the idea occurrence phase. Consequently, mind wandering leads to leisure time inventions since the individual is away

from the firm, discovers a new idea, and links it to the organization. As a result, the second proposition is formed.

*Proposition 2: Mind wandering leads to the occurrence of leisure time inventions.*

Propositions 1 and 2 are related in that they form a sequence of events. First, the employee allows his mind to wander during leisure activities (proposition 1). Then the mind wandering activity might lead to the discovery of an idea, in this instance, the leisure time invention (proposition 2).

#### **4.2.2 Idea forming**

After having an idea for an invention during their spare moments, the next step observed is to form the idea. The purpose of this phase is to communicate the notion to others and structure it such that someone can understand it. As shown in Figure 2, this is the first point of contact for the LTI with the firm, albeit components such as writing a business plan or describing prototype characteristics before presenting to the firm have been noted in certain circumstances (Interview 4; Interview 10). As a result, this phase occupies the space between the firm's outside and inside. This important stage was completed utilizing a variety of approaches or a mix of methods. One of these methods is voicing the idea to co-workers, supervisors or family and friends. Quotes like these illustrate this:

*"(...) when I came across this idea, I pitched it to a couple of guys from work."* (Interview 1).

*"The owner of the company, who is 2 years younger than me, also had the thought process already (...)"* (Interview 6).

*"But pretty early or actually through the whole innovation - also for the other idea - I skyped a lot with 3 friends from my university (...)"* (Interview 7).

In general, family and friends were proven to be more supportive about the ideas proposed by their family members or friends, whilst colleagues and supervisors were shown to be more sceptical and critical.

*"Then they just said, 'that's not possible because (...)'."* (Interview 8).

One explanation given was that co-workers might not appreciate the notion that a part of the overall budget would be set aside for the following stage's LTI execution, which the co-worker might have utilized for their own project (Interview 4; Interview 8).

Another method observed was motivational, namely arguing why the idea is desirable to pursue. Many motives were driven by outside competition or the failure of their own products in the marketplace.

*"Because we were in the situation where the devices were failing in the field and we were under a lot of pressure to implement an alternative solution as quickly as possible, and this was the only alternative solution that was slim, cost-effective and somehow made a promising impression. Therefore, the motivation was very high (...)"* (Interview 12).

Motivating someone to try something new was not always successful.

*"I would say that the solution was of course critically appraised at the beginning because it was somehow new. We had never had a system like this in any other machine before, and that's why we first had to find a bit of trust and acceptance in the company."* (Interview 12)

Motives were also provided because of process improvements.

*"(...) when the staff come to me and say, "[Name], I'm in pain about this and that... can't we take a break somehow?" and then I thought, now you have to think of something (...)"* (Interview 15).

Personal devotion and conviction in the idea's potential were also emphasized.

*"Because I was sure, actually, that it had to work like that. I'll say that it's actually based on the idea that I have a purely instinctive / well, as a developer, you need a certain feeling for things. I was relatively sure that I could find something in the solvents and that I could possibly recover the stuff. I was relatively sure of that. And that encouraged me to keep at it."* (Interview 17).

External parties had to be motivated in some cases.

*"That means you also have to get the suppliers on board and say, "make this for me, this is my vision, this is going to be an absolutely gigantic product"."* (Interview 8).

If top management was not motivated by the idea, then they would have cancelled the idea.

*"(...) the support of the management is important. I think that if they had said, "Yes, this is not going to work (...) then it would have been difficult."* (Interview 18).

A third way observed is the construction of a business case, which provides an overview of which consumers to target, which markets to serve, and how to deliver value.

*"Of course, products but also market(s) and knowing how to sell (...) so that's the base of the business case (...)"* (Interview 1).

Or: *"(...) this is what we estimated that will cost before we have something in place. And these are potential customers that could have an interest in the use of such a [product type]. And of course, this is an estimate, you have to guess. And then I made an estimate, then we have a return on investment in three years' time (...)"* (Interview 3).

Or: *"(...) the collection planning starts with making an assortment strategy"* (Interview 8).

The business case is critical for the LTI process since an invention with commercial application is considered to be an innovation (Davis & Davis, 2007; Edwards-Schachten, 2018), which is desirable for some organizations for a variety of reasons. It boosts the company's image to outsiders as more innovative. It might also provide the firm a competitive advantage over their competition. Of course, only the LTIs who introduced a new concept for the corporation to market were involved in this factor. As a result, advancements in the manufacturing process did not involve this method.

A fourth way found is defining the prototype's functionalities before conducting research.

*"I want to have electronics in it. I want to make it self driving."* (Interview 1); *"(...) this assistance comes or would come from an electronic control system, which must not fail above 40 km/h. So above 40 km/h is absolutely necessary and since this vehicle is intended for higher speeds (...)"* (Interview 9).

Usability is vital in addition to functionality.

*"(...) and then we came to the agreement that it was actually enough to build a glove like this in principle"* (Interview 15).

Creating a shared perception of appearance is also crucial.

*"And I have already discussed it with her and said, "make me a drawing". But I didn't say what exactly it should be - including all the technical data behind it. I just said, "make me a drawing"."* (Interview 8).

Making a strategy for how to progress and when components will be developed eases the following stage and may assist anticipate budget and time.

The forming phase's overall intention is to make the suggested concept more concrete and explicit to the firm. This stage is important to the LTI's success because if the concept is not properly understood by the management, resources will not be allocated to the next stage. As aforementioned, many strategies were utilized to develop a shared understanding of the concept. Discussing the idea with family, friends, and colleagues has been shown to increase confidence and critical evaluation of the concept, so providing encouragement and anchoring the expectations. The decision to present the notion to non-firm members was intriguing. As one might assume, the concept was first discussed with co-workers, although this was not always the case. Perhaps this is the case because most people spend their leisure time with friends and family rather than co-workers. As a result, the third proposition comes into being.

*Proposition 3: Sharing the concept with relatives, friends and/or colleagues results in a better understanding of the concept among the members and a more objective view before being evaluated.*

Motivating the idea to the firm has been shown to be critical for the idea to be carried out in the next step. The main reason behind that is that the corporation is less likely to act unless it is properly motivated as to what value the idea creates and clear rationale as to why the invention should be pursued. This motivation might be founded on intrinsic motivation, with the belief that something must be achieved, or on benefits such as a competitive advantage over competitors, smoother internal operations, or a more innovative image. As a result, the fourth proposal is conceived.

*Proposition 4: Strong motivation to create value is required for the company to allocate resources and pursue the idea before being evaluated.*

### **4.2.3 Idea judgment**

Following the presentation of the idea within the organization, two possibilities emerged. One that enabled the individual to develop the idea within the organization. The other was a denial of the concept. This section provides the rationale behind the selections. The motivation for implementing the idea was based on the predicted competitive advantage provided by the invention over the conventional application.

*"And it's clear that if we can do that, then we would have a unique selling point, and then of course we could stand out from the market."* (Interview 6).



A second reason was that the invention enhanced internal procedures.

*"Sure, we are in our "just-in-time" concept, which means we have a certain amount of time and of course we have to produce a lot of output (...) and if that goes faster with the [Invention], well, I think every side benefit from that."* (Interview 15).

Or: *"That means that most of the gaskets at that time came off the production line as fully coated gasket layers. In other words, the process also gave us the advantage of being able to coat, let's say, all the layers, even crooked ones and so on, which were much more difficult to coat in a casting process or which were not practical to coat, only with a lot of scrap. And with the coating process we had almost no rejects."* (Interview 17).

Another rationale for pursuing the idea was that the positive externality of the business's image by making the firm appear more innovative owing to the innovative value of the presented idea.

*"And also, people are just coming to me like: "Hey, I've seen your story in the newspaper, sounds really interesting and that's why I am now applying at [Company name]". So, yeah, you could really see this as, even though the product itself is not interesting to [Company name], it has created this marketing perspective."* (Interview 1).

It is worth noting that this LTIs was pursued not because of the direct added value in terms of a new or better product or process, but because it would increase the perceived innovative image.

There were several reasons why the idea was rejected inside the organization. One of these reasons was that the firm was hesitant to provide capital investment and resources.

*"Well, I personally think that they don't put it in practice. Just because of the costs."* (Interview 7).

In addition to resources, also internal rejection towards the product seems to be the reason for rejecting the project.

*"[And what factors are preventing the [product name] from going ahead right now?] Money and acceptance within [Company name] to pursue such vehicle concepts. Or even to be willing to present a modified vehicle concept."* (Interview 9).

Overcoming resistance to change towards the idea was one of the challenges.

*"And then, keyword [Name of city], there are of course also people who oppose change. They've been doing things this way for 30 years and don't want to change because they don't want to understand why they should do things differently now. I don't know what the reason is, whether it's age or disposition, but in any case, there are always people who find innovations disturbing. They don't want to do it this way, they want to do it differently, and they think it's unnecessary to have to change at all. So that was a problem from time to time."* (Interview 11).

Two approaches to dealing with opposition to change were mentioned.

*"Yes, it was a combination of conviction on the one hand, i.e., arguments that justified the change, and then of course there was also the "order from above", i.e., the directive that simply determined that this is how it is done now. Through the management hierarchy."* (Interview 11).

Another reason a company did not implement the idea was a mismatch between the firm's core competencies and the invention.

*“So [Company name] in essence is a consultancy firm, they help clients, gets their projects running faster and supply people, so [Company name] doesn't have a real core competence technical wise, but it's split into different disciplines, (...) and [Company name] also doesn't have a product or a product line.”* (Interview 1).

Or: *“(...) it was actually not a business of [Company name], which is why it was probably the right decision on their part not to put any more money into it.”* (Interview 4).

Rejected ideas or inventions were usually not fully eliminated from the corporation but were instead set aside or archived. Another argument may be that it is not the ideal moment to publish it right now according to the company's strategy.

*“(...) this seasonal thinking. It might be realized in the next summer season. But we are not sure whether this happens or not.”* (Interview 7).

This phase focuses on why an LTI was allowed for internal execution and what considerations deterred the firm. Some LTIs provide a competitive edge over rival offers. If the company is aware of this, it is more inclined to invest in the concept in order to outperform the competition or increase sales. In addition to surpassing competitors, certain LTIs improved the firm's image. LTIs that are truly novel and assist the organization in differentiating itself and increasing its perceived innovativeness were accepted for internal execution. Finally, improved internal processes were identified as candidates for management approval to enable for internal development, since perfecting the manufacturing process might enhance output while potentially saving money. As a result, the fifth proposal is formed.

*Proposition 5: Competitive advantage, enhanced internal processes or perceived innovativeness of the company lead the firm to green lighting the LTI.*

On the other hand, needing to invest in expensive tools to possibly cure a minor issue was viewed as a difficult choice for accepting the LTI. Consequently, the predicted expenses in relation to the benefit were assessed, resulting in the rejection of some LTIs. In addition to the costs, internal rejection towards the new idea was also observed, this rejection could be either classified as management simply not accepting the LTI or that the LTI would result in unwanted change. Finally, it was discovered that a mismatch between the core competencies and the suggested LTI resulted in proposal rejection. Having to invest in building a new separate branch from the firm's usual activities simply to realize an LTI is difficult to motivate, especially when new knowledge and expertise must be included. These three reasons were observed to lead to the abolition of ideas, and thus to the sixth proposition.

*Proposition 6: Costs, internal rejection or mismatch between core competence and new invention lead the firm to idea abolition.*

#### 4.2.4 Idea execution

If the organization grants the employee the "green light" to pursue the proposed idea, the next phase is to realize the project internally. Employees were given limited capital, as well as some personnel and available working hours, according to the interviews. Capital was restricted and only used to create a representation or a functional prototype.

*"Here you have a small budget, start working on something that you can present."* (Interview 1).

The project's available staff varied from external university students to internal colleagues.

*"And the student was able to kind of figure out more about hardware and software and the platform needed to generate software for [product name]."* (Interview 2).

Or: *"We started really small, I started with [a] research student in the first place, and he made the first demonstrator for the electronics (...) and then I hired an electrical engineer, and he worked for one-year full time on this project. I had the freedom, I'm responsible for the software engineering part of [Company name]. So, I had one software engineer also available for this project. So, I had two engineers working for one-year full time on this project."* (Interview 3).

Some staff had to create the idea after their shift at the firm.

*"(...) we have the Monday evening always as the (...) that's all that we are working on every week mostly (...) and so we just came together every Monday."* (Interview 1).

However, in the majority of cases, the execution took place during business hours. Alternatively, personnel were given a time limit to focus exclusively on the concept.

*"You can spend something like 16 hours in total on it."* (Interview 2).

The employees were creating a physical representation of the idea using the resources, or a part of them. Software or software features were developed with minimal functionality as a "proof-of-concept".

*"The first prototype I presented were just a couple of bowls. Stick together with an outer shell so it could rotate, and it sort of looks like this. How it eventually should look like (...). We came together, build something, test something."* (Interview 1). And: *"We piloted this project. So, we built ten of our systems (...)."* (Interview 1).

Or: *"(...) so then the first prototype came and then it was set up. You immediately saw the reactions."* (Interview 8).

While building and testing the prototypes, a process of learning was observed, and improved iterations created. For example, with a new manufacturing method, new secondary chemicals and tools must be developed and studied to enable the creation of the primary outcome of the process.

*"So, I found a solvent combination that actually had very good dissolving properties for these polymers, but then also evaporated so little that the material could be recovered without any problems."* (Interview 17). And: *"So the nozzle technology was also a challenge (...) in order to actually find a nozzle combination that gave us a very good spray pattern."* (Interview 17).

Feedback was given by different people, such as by other employees.

*"(...) yes, great idea and then there'll be no more cases of sickness"* (Interview 15). This feedback helps in enhancing functionality and resolving the underlying problem. In some cases, the employee's supervisor also provided feedback.

*"And during the test phases he [the supervisor] always gave feedback. Just when we had a failure at first, he said, "Yes, maybe we could optimise that part," and we brainstormed together again and again and optimised the idea."* (Interview 18).

Feedback was most of the cases neutral, showing both positive and negative aspects.

*"(...) and say, this and that is already ready for the market or this and that I still have to do."* (Interview 8).

The new product or method did not always receive valuable feedback.

*"So, at first there was resistance from the workers who would eventually use it on the production line. And then there was the remark, "Oh, that'll never work."* (Interview 18).

The employee who introduced the idea to the company also directed and oversaw the development process as well as through struggles, resulting in a form of leadership. This is an idea champion who is personally devoted and tenaciously motivated to sustain the idea through challenging conditions to realization (Howell and Boies, 2004). According to the interviews, the employee also functioned as the idea champion, steering the project from idea occurrence through idea formation and finally to idea execution. This entails conducting your own prototyping.

*"Well, up to a certain point, until the first prototypes were there, I did it completely on my own."* (Interview 8). And persisting with the concept even when colleagues disagreed.

*"They just said "that's not possible because (...)". And then I said, "but we have to implement that somehow, because (...)."* (Interview 8).

Or dealing with novel technological issues.

*"Technical problems. So, materials implementation, material tests, processing. That was all new territory."* (Interview 8).

Encouragement from others may also be beneficial to the idea champion. Because of his or her position of authority and influence, the boss's support may be useful in carrying out the idea and promoting it through the organization.

*"My boss supported me the most, because he was also enthusiastic about the idea (...)"* (Interview 16).

In certain cases, a steering committee was established. This steering board was composed of individuals with varying types of expertise. The steering board's purpose was to direct the development process and align it with the company's strategy.

*"I installed a kind of steering team with experienced people from electronics and software. And we had a weekly meeting with the people that were implementing this design, and with the thought in mind that we would focus on a generic solution for multiple customers"* (Interview 3).

Since now the idea is tangible, the term "idea" has been substituted by "invention". A learning process occurred while developing the prototype using the provided resources, resulting in improved versions of the invention. This learning process comprises researching hardware

and/or software and adapting it to the demands of the invention, as well as gathering preliminary feedback from involved stakeholders. This is because this loop produces a qualitatively better and more specialized version of the invention, which the corporation is more likely to employ. As a result, the seventh proposal is established.

*Proposition 7: A cycle of learning, improving, and feedback leads to improved iterations of the invention and, as a result, a greater likelihood of application inside the organization.*

Integrating novel technologies, materials, or software presents several obstacles, roadblocks, negative comments and frustrations. It is critical to have a devoted and motivated idea champion to maintain the invention from concept to implementation. To bring the concept to fruition, the employee must endure frustration and remain committed to the creation even during challenging times. As a result, the eight proposition is formed.

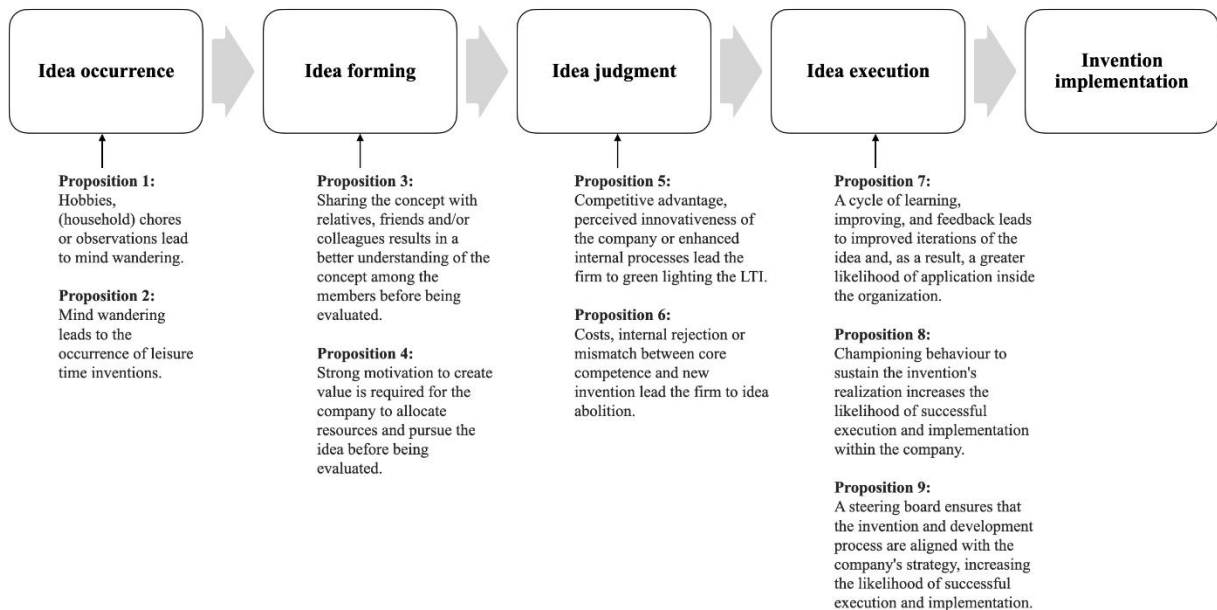
*Proposition 8: Championing behaviour to sustain the invention's realization increases the likelihood of implementation within the company.*

While developing the invention, the idea supporter may lose sight of the bigger context, which includes the company's alignment. This is due to the concentrated development and possibly fascinating development path that may be interesting to investigate but is not required. This might be explained by the fact that most staff seemed to enjoy the process of tweaking and refining their idea. This outcome exceeded expectations and was quite fascinating since it appears that this strategy was chosen for strategically essential initiatives, i.e., those associated with the core competence of the firm. As a result, a steering committee can provide this guidance, which leads to the ninth proposition.

*Proposition 9: A steering board ensures that the invention and development process are aligned with the company's strategy, increasing the likelihood of implementation.*

The propositions formulated by the findings illustrate the narrative of an idea occurring during free time to preparation and voicing their thought, which leads to the execution of the offered idea and successful implementation. The propositions are summarized in figure 3

**Figure 3: Propositions observed in each phase of the model**



## 5. Discussion and Conclusion

Integrating LTIs into business has implications for both the company and the employee. Businesses, for example, have launched new products, enhanced processes, and increased employee satisfaction as a result of LTIs (Davis & Davis, 2007). Furthermore, with an increase in available leisure time (Poser, 2010), a trend toward more knowledge-intensive employment (Pink, 2009), and raised levels of job satisfaction, the possibility of stumbling onto an idea during spare time is inescapable. This research aims to construct a model of how LTIs form and progress toward deployment within the confines of an existing organization. This has resulted in the formulation of the research question, which focuses on the process by which ideas generated in the employees' spare time find their way into an established company:

*How are leisure time inventions implemented in businesses?*

The resulting model of LTI implementation within the company therefore provides an initial foundation that may be supplemented with additional theoretical insights to develop a more specific model of LTI implementation inside enterprises. The model is discussed in the next part, and theoretical and practical implications are presented. The study's limitations are then given, and the next research directions are developed before this section closes with a conclusion.

### 5.1 Theoretical Implications

The four phases of idea occurrence, idea formation, idea judgment and idea execution give a framework for how these ideas arise and grow into product inventions or process improvements

relevant to the organization. While the structure of this process model is comparable to Perry-Smith and Manucci (2017)'s findings, the participation of contacts, i.e., the engaged network, is inverted. Their model refers to the network's indirect, passive engagement in the early phases, whereas this model refers to the network's more direct or active involvement in the idea occurrence phase. This is significant for the idea generation literature since it may be argued that the network plays an active or passive role in the early stages of how an idea arises, and that other aspects, such as personal characteristics, are crucial in complementing the personal network.

### **5.1.1 Idea occurrence**

During the first phase, idea occurrence, three themes were discovered that induced the employee's mind to wander, these were hobbies, (household) chores and observations. This process might be explained in further detail by the theory of knowledge (re-)combination and/or the theory of the strength or weakness of relationships (Baer, 2010; Granovetter, 1973; Schillebeeckx et al., 2020). Throughout the recombination process, employees leverage their social networks to gain insights, evaluate information, and question their own perspectives (Schillebeeckx et al., 2020), this might affect the focus of the novel idea dependent on the inventor's network during leisure time. This means that weakly tied groups, such as a soccer team with a varied collection of individuals and expertise, may lead the employee to generate more original ideas than a more strongly connected group of work colleagues enjoying an afternoon drink. This is consistent with Granovetter's findings (1973). The significance of these findings is that it combines knowledge (re-)combination literature and the concept of strong and weak ties to explain the prevalence of leisure time inventions. This implies that the network with whom one engages in one's leisure time activities influences how knowledge is (re-)combined.

This does not account for knowledge recombination during (household) chores or observations that may occur while the employee is alone. Personal characteristics such as work experience (Frosch et al., 2015) and/or cognitive ability (Zwick et al., 2017) may ignite the idea occurrence phase in this case. This was also observed during the interviews, when an employee discovered a fresh concept while doing observations based on work experience (interview 12).

While the dual viewpoint of creativity was argued in the theory section above to be either on the personal network or on individual characteristics to derive towards an LTI, the results in this case show that both viewpoints do not substitute but rather enhance each other when possible. It demonstrated that while some cognitive capacity was required in a social situation to develop the LTI, cognitive ability to recombine knowledge is also required in an isolated setting.

Davis and colleagues (2014) discovered that more socially oriented hobbies were positively related to innovative value in individuals who carried their LTI into the workplace. This study's findings agree with this conclusion and encompasses activities ranging from active and social interests like cycling with a group, to passive and social activities like watching a movie with a companion (Interview 14; Interview 15). Thus, during the idea occurrence phase, the social

aspect of a leisure time activity is vital. Both focused and exploratory types of hobbies have been observed which could be attending a musical event (interview 5) (Davis et al., 2014). Furthermore, social activities are associated with the sharing of thoughts and insights from others, which might drive the mind wandering construct to activate. In addition, it has been demonstrated that substantial connection with outside information sources increases creativity (Dahlander et al., 2014). However, as previously stated, there have been instances where the employee was alone and the LTI was successful (Interview 1; Interview 18). As a result, while this study agrees with the importance that social hobbies have on creativity and knowledge (re-)combination, cognitive capacity has been seen throughout both social and solo pursuits of a free time activity.

This data set also revealed the concept of people who think about issues from work in their spare time and generate good suggestions (Interview 18) (Davis et al., 2014). It is also more typical in this instance for an employee to come up with a fresh concept while actively pursuing a solution or enhancement during their free time. And this ability to recombine ideas in innovative ways is highly valued for idea occurrence (Davis & Davis, 2009) and mentioned in all the interviews as a prelude for mind wandering and the beginning of the LTI story. The significance of this is that if people feel enthusiastic about their job and inside the organization, they are more likely to reconsider acts or procedures within the firm, which might lead to innovative ideas or improvements.

### **5.1.2 Idea forming**

During the second phase, the idea formation phase, the thought began to take shape, particular elements were worked out in greater depth, and reasons were made as to why the idea should be pursued. The literature on voicing ideas (Burriss, 2012; Satterstrom et al., 2020) provided a solid foundation of communicating the idea with members of the firm or close network. It has also been observed that whom the idea has been shared with is important, with ideas discussed with members of the firm being more sceptical than ideas discussed with family and friends. This may have an influence on the outcome of the following step, which determines the firm's commitment to the proposal, because if the employee gets critical yet constructive comments in advance, he or she is better equipped to respond to them in front of management.

Employees expressing their ideas to management in this dataset did not typically fear a power imbalance or negative repercussions, making it simpler to share their thoughts, which is consistent with the findings in the literature (Burriss, 2012; Satterstrom et al., 2020). The significance is asserted in that this atmosphere encourages active dialogue between employees and management, which facilitates the discussion of ideas, which is vital for the presentation of LTIs.

Finally, consumer- or product-focused proposals were complemented with a business case that outlined the target market, value proposition, and/or price plan. This approach is related to Osterwalder and Pigneur's (2010) business model canvas, which describes different divisions of activities such as how the offering is created, how it is promoted, what its value propositions are, and how the price structure is organized (Osterwalder & Pigneur, 2010). Considering these



product-focused ideas, the realization, manufacturing, and marketing is relevant, since if the potential market for the leisure time invention is large enough and the idea is feasible to realize, management may be more willing to dedicate resources.

### **5.1.3 Idea judgment**

After the idea has been voiced to the firm, the idea judgment phase has been observed. Even though the majority of the LTIs proposed are not related to using current products from the firm, as embedded lead users do (Schweisfurth & Raasch, 2015), these seemingly unconnected concepts are commonly implemented within the boundaries of the enterprises. It was expected that embedded lead users would play an important part in how the idea emerged, however this was not the case. This might be explained by the fact that a substantial portion of the proposed LTIs involve process improvements, or by the assumption that individuals have little connection to the goods manufactured by the firm where they work, making them less inclined to interact with a community centred on the product.

However, lead users can serve as a need-forecasting laboratory for marketing research since they are experienced with scenarios that most others will confront in the future (von Hippel, 1986) and hence should not be overlooked. Firms were found to be typically inclined to pursue ideas supplied by their employees, which might be explained by the fact that employees were generally well prepared and enthusiastic about their concept. Overall, proposals that established a competitive edge over competitor offers, improved internal procedures or a perceived innovative image, were green lit for the fourth phase. This finding is relevant for the LTI implementation literature since it identifies characteristics that are positively linked to LTI implementation within a firm.

Despite having one of the aspects, the proposal was rejected owing to excessive resource investment, internal rejection or a mismatch with the firm's core expertise. Perhaps the reason for the restricted resource investment is because the hobby-based idea appeals to a small market with limited revenues, making future resources unlikely to be committed. One of the reasons misaligned ideas were likely to be rejected is because the company did not develop its absorptive capacity to be able to implement the idea (Ramayah et al., 2020). Acquiring expertise from a new source, which resides in the employee's spare time, necessitates adaptation or establishment from the ground up. In addition to the low predicted market and revenue, as well as the requirement to invest in absorptive capacity, a reasonable justification may be made for not investing in the LTI. This is critical because it emphasizes aspects that are negatively linked with LTI adoption and parallels the addition to the LTI literature discussed above.

### **5.1.4 Idea execution**

The realization of the idea was undertaken and examined during the fourth phase, the idea execution phase. This step was found to be highly reliant on the proposed LTI's breath yet critical to its implementation within the organization. A budget, team, and reserved time were allotted as resources to build a physical or digital representation. A cyclical learning process

was discovered with the goal of improving the prototype. The strategy taken by employees in dealing with the challenge of limited resources while simultaneously generating a feedback loop from idea, to prototype, to feedback is akin to the lean start-up framework (Shepherd & Gruber, 2020). A more inside-looking learning attitude has been observed, as opposed to the usual lean start-up outward-looking learning mindset (Shepherd & Gruber, 2020). This might be because the outward-looking viewpoint was completed in advance during free time with the case-specific setting and scenario. The relevance here is that the lean start-up process has been found to be used not during the establishment of a new organization, but rather during the development of a new idea within the organization. This therefore extends the concept of this technique to a new domain, idea execution within the boundaries of a firm, where workers, came up with a similar approach.

Guidance and alignment with the strategy of the company were provided by the idea champion and/or an established steering board. Throughout the interviews, it was observed that employees did not simply transfer the idea to management and then expect their management to develop it; rather, employees took an active idea championing role for reasons such as a greater sense of accomplishment and fulfilment in their job (De Clercq & Pereira, 2020; De Clercq & Pereira, 2021). A small steering committee of various individuals was formed if the employee wished to secure a close fit with the company and avoid misalignment at the completion of the development. The effective realization of the idea has resulted in the application of the LTI within the firm; at this point, the destination of internal implementation has been achieved.

## **5.2 Practical Implications**

The practical implications are grouped into two categories: those for employees and those for management. Both will be examined in further detail in the following paragraphs. Based on the findings, employees who have an idea in their spare time should first write it down on paper or digitally. This ensures that the concept is not forgotten during active pursuits. Furthermore, consider or write about explanations for why this concept is desirable, relevant, and what problem it solves. In general, the more preparation you do before discussing your idea, the better.

Then, preferably with close colleagues debate the concept; this is vital since it allows for a critical reflection of the proposal. If this possibility is not accessible, family members or friends will suffice but should be approached with caution. The aim is to be adequately prepared before presenting to management, improving the likelihood of acceptance for implementation and realization. Writing and presenting a brief presentation of the idea with the desired features and functions might help managers develop a common idea.

If the concept is accepted for further development, it will require devotion and active development throughout the idea execution phase. According to one of the interviews, it is critical to be visible when developing your idea and not to hide away tinkering (interview 1). One reason for this is that it demonstrates your commitment, and if further resources are required, management may agree to provide them. Gather feedback from relevant stakeholders

and incorporate it into the current version of the invention for improved performance and a better fit with the requirements. If successfully implemented, two solutions were revealed in the results to deal with employees who reject the suggested proposal. Either initiate a discourse with the goal of finding underlying issues, or management forces staff to accept it.

The employee's management is found on the other side of the conversation. A fantastic concept from an employee is useless if management does not act on it; hence, the following implications for management can be advantageous. First, creating a work atmosphere that encourages open communication between employees and supervisors guarantees that employees may readily express their ideas. Planning community activities during leisure time, i.e., after work, such as sport activities or cinema visits, increases not just the link between employees but also stimulates the interchange of ideas and interests amongst employees and potentially start the mind wandering process. It is critical to incorporate employees from various professions in order to establish a varied group of employees. Since this variety of occupations has been demonstrated to be beneficial. Furthermore, if applicable and if the employee has a strong interest in an innovative technology produced in the laboratory, allow the employee to experiment with the technology or new product in his or her spare time. This may boost employees' mastery attributes (Pink, 2009) and assist in reaching new degrees of proficiency in the idea's content.

If an employee approaches management with a novel idea, critically evaluate and listen to determine its potential. Due to limited resources, not every proposal can or should be implemented, but critically debating the idea helps to filter it so that it may be allocated and/or prioritized. The employee's purpose is generally to see their concept effectively implemented; otherwise, he or she would not have stated their idea in the first place. As a result, the employee is at least somewhat enthusiastic about the notion. Rejecting the suggestion should be handled with care because it may reduce workers' work morale and connection to the company. In this circumstance, critically explaining why the idea will not be implemented and presenting several reasons for this might help. Shelving these ideas for a later stage is a possibility, as is lowering the intended scope.

If the idea is approved, talk about how it will be implemented beforehand. This comprises the amount of resources allotted, the budget, staff, working hours, and who oversees. This can be standardized with internal policies encouraging employees to realize their leisure time inventions, or it can be customised to the demands of the execution of the project. After this step, if the idea is successfully implemented, it should be promoted internally. With a suitable reward, express your appreciation and gratitude to the employee(s) who realized the proposal and achieved greater benefits for employees and/or the firm. Finally, use relevant KPIs to assess the impact of the new idea and tweak it if possible.

### **5.3 Limitations**

One of the clearest drawbacks is that CIT is reliant on participants' recollections and their capacity to recall examples of the ideas in question (Care, 1996). According to Sharoff (2008), even if researchers must ensure that study participants are chosen accurately in advance, there

is always the possibility of embellishment of a tale. As a result, narratives may not completely depict reality, and critical aspects may be missed or incorrectly remembered, lowering the model's quality and elements within the model. To address this, respondents were asked ahead of time to recollect the incident. This allows the employees to reassess their experience and so appropriately recall the incident. Consequently, improper interpretation during the coding process may have an impact on the models' validity and accuracy. One solution is to use double coding, in which two individuals code the same dataset and compare their output. Because this option is not possible, staying close to the data is the best choice. Another constraint is the sample's size, which may prevent some significant aspects of the population from being recorded in this sample. Finally, the established theoretical framework may have unintentionally affected the narrative questions during the interview, so shaping the results and potentially leaving out crucial propositions. Subsequent study should address or validate these findings, which leads to the future research agenda.

#### **5.4 Future research agenda**

Following this qualitative investigation, which results in a model having propositions, quantitative tests to confirm or reject the assertions are necessary to verify the model and possibly alter it as needed. The interaction between boredom and creativity has been investigated (Mann & Cadman, 2014), but how this influences mind wandering, and the production of leisure time innovations has not been uncovered during the interviews. Since an earlier study discovered a link between personality traits to novel and valuable output (Siebelink & Hofman, 2019), various data, including personality, might be used in a new study investigating the influence of personality traits on creativity during leisure time. Employers may use these findings into their hiring practices if the company wishes to differentiate itself from competitors' offers and hence relies on creative and inventive employees.

#### **5.5 Conclusion**

This research examined the process of employees bringing ideas from their spare time into the workplace. The resultant model of idea occurrence, idea forming, idea judgment, and idea execution provides a foundation for the implementation process with various implications for employees and management, and thus opens numerous avenues for academics to explore, extend and/or falsify (Mitra, 2020).

Theoretical implications for each phase of the model were given, including knowledge (re-) combination, the network one connects with during leisure time, and the degree of embeddedness. Employees, for example, must develop compelling arguments for the importance of the idea and the project's pursuit. Then they must have excellent championing skills in order to drive the concept forward during challenging conditions. Managerial implications include the development of an encouraging workplace that allows for the expression of ideas and the participation in common leisure time activities. Following receipt of an LTI, management should critically analyse and evaluate the proposal's potential. Finally, research avenues include assessing boredom and personality factors on mind wandering.

## 6. Appendix

**Table 3: Summary table of interviews**

<b>Interview number</b>	<b>Employee role</b>	<b>Leisure time activity</b>	<b>Invention type</b>
Interview 1	Project manager	Observation	Product invention
Interview 2	Innovation consultant	Observation	Product invention
Interview 3	Software engineering manager	Observation	Product invention
Interview 4	Research & development	(Household) chore	Product invention
Interview 5	Research & development	Hobby	Process invention
Interview 6	Customer support	Hobby	Product invention
Interview 7	Marketing intern	Observation	Product/marketing invention
Interview 8	Consultant	Hobby	Product invention
Interview 9	Research & development	Observation	Product invention
Interview 10	Research & development	Observation	Product invention
Interview 11	IT project manager	Hobby	Process invention
Interview 12	Head of the Mechanical Design Team	Observation	Process invention
Interview 13	Researcher	(Household) chore	Process invention
Interview 14	IT project manager	Hobby	Process invention
Interview 15	Manufacturing	Hobby	Process invention
Interview 16	Store manager	Observation	Process/marketing invention
Interview 17	Polymer chemist	Observation	Process invention
Interview 18	Student trainee	Observation	Process invention

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