11. The role of design (thinking) in facing complexity and generating innovation in the entrepreneurial world

Gianluca Carella, Francesco Zurlo, Svafa Grönfeldt

11.1 The role of startups in the innovation landscape

The consequences of the recent global economic crisis, together with the ongoing effects of the Fourth Industrial Revolution, have led governments of both developed and developing countries to acknowledge innovation as the main driver of competitiveness for their economies (Baumol, 2002). Indeed, the significance of innovation in socio-economic terms, such as enhancing the living conditions of the general population, offering advantageous new solutions, and generating employment opportunities, is widely recognized. Currently, innovation is regarded as the primary catalyst for regenerating and expanding economies, particularly in a globalized and highly interconnected business environment.

In this panorama, entrepreneurship, and particularly the cluster related to startups, play a crucial role. Startups are central to continuously bringing forth new and creative ideas, and introducing new products and services developed by startups into markets

is an important driver of innovation. Startups are widely recognized as key drivers of technological innovation, economic agility, and job creation (Luger and Koo, 2005). Indeed, the notion of a startup has been conceptualized as a type of organizational structure that facilitates innovation processes, particularly in contrast to innovation that arises from existing firms (Freeman and Engel, 2007). Prior to the mid-1990s, the term *startup* typically referred to the initial phase of any commercial activity (Cockayne, 2019). Over time, the term's definition became more specific, specifically referring to establishing new enterprises in the semiconductor and high-technology sectors.
These enterprises were typically situated and saw remarkable expansion in highly developed industrial regions, primarily Silicon Valley.

However, what justifies attention to startups is perhaps the element that most characterizes them as an entrepreneurial phenomenon: their fragility. While the startup model has been recognized as a reliable means for achieving significant innovations, it is also very vulnerable to failure. The Global Startup Ecosystem Report of 2019 reveals that the success rate for entrepreneurs in launching their own businesses is only one in twelve, which aligns with the well-publicized data indicating that 90% of startups eventually fail.

The failure of new venture enterprises can be directly attributed to the fact that these organizations often operate in highly uncertain settings. Entrepreneurs frequently have the challenge of creating something innovative with limited resources, and the belief they have in the quality of their product may not align with market preferences. Effectively promoting a novel product or service necessitates proficient expertise and the swiftness essential to outperform rivals. Ultimately, founders must also possess the ability to persuade investors, acquiring evidence of the feasibility of their business concept as expeditiously as feasible (Rancic Moogk, 2012); and without taking into account the intricate and unpredictable obstacles that can arise along this journey.

11.2 The role of Design Thinking in boosting innovation

In view of the two-way bond between entrepreneurship and innovation (Drucker, 1985), academics' and practitioners' interest shifted over time as well to innovation management approaches and their applicability in the context of innovative startups in order to reduce the most consolidated problems. One of the methodologies that seems able to make a significant contribution to the startup world is Design Thinking. Although the breadth of its definition is central to academic discussions around the topic (Micheli *et al*., 2019), we can refer to it as «a human-centered approach for innovation, which is grounded in the ways of thinking and working common to the design profession» (Klenner *et al*., 2021, p. 2). As a relatively new concept in the entrepreneurial area, Design Thinking has gained popularity in the management field since the late 2000s. It is known for being effective in situations with much ambiguity, encouraging innovative problem-solving methods (Micheli *et al*., 2019). Design Thinking (DT) has been widely recognized by academics and professionals as a powerful driver of innovation and transformation (Brown, 2008; Martin, 2009; Liedtka, 2015; Sheppard *et al*., 2018). It has evolved continuously, transitioning from its use in product development to its application in managerial practices for addressing strategic challenges (Martin, 2009; Kelley and Kelley, 2013; Dell'Era *et al*., 2020). Based on a range of research (Brown 2008, 2009; Carlgren *et al*., 2016), Design Thinking is an effective approach that involves a collection of approaches, methodologies and tools to help managers tackle and solve various complex challenges.

In recent years, the fundamental framework of Design Thinking has experienced several changes, including collaborations with LSAs (Large-Scale Assessments), with the aim of applying the principles of this approach to startup development (Dell'Era *et al*., 2020). Together with its unique culture, mindset, and practices, DT has long been recognized as a significant catalyst for innovation (Hassi and Laakso, 2011; Johansson-Sköldberg *et al*., 2013; Carlgren *et al*., 2016; Elsbach and Stigliani, 2018; Micheli *et al*., 2019). Its value in the management field, and more broadly in the business realm, is widely

recognized for its ability to generate new business opportunities by identifying emerging trends and socio-cultural models (Verganti, 2008, 2009). It also facilitates the innovation of business models in established industries (Fraser, 2009; Holloway, 2009); the creation of unique meanings for products and services (Verganti, 2009); the development of market conversations around new value propositions (Nielsen *et al*., 2017); and the adaptation of interactive patterns and user experiences based on continuous feedback from the marketplace (Gruber *et al*., 2015).

11.3 How Design Thinking can support entrepreneurial activities

While there is a lot of enthusiasm and attention surrounding Design Thinking in the business world, the same cannot be said in relation to its role in entrepreneurship. The enthusiasm generated in the field of management is not mirrored in the entrepreneurial literature. Even if Design Thinking has been recently advanced as a relevant asset for startups and entrepreneurs (Klenner *et al*., 2021), scholarly accounts lack substantial evidence about the contribution this approach can deliver along technology startups' evolution and growth. In the past, design was commonly employed in startups as a supplementary instrument to technology, mainly as a means to facilitate and enhance the utilization of technology in order to maximize the spread of new innovations (Eisenman, 2013). Only recently has literature emphasized the specific implications of Design Thinking for startups. Mansoori and Lackéus (2020) explore its unique contributions to the field of entrepreneurship in comparison to other techniques. Klenner *et al*. (2021) demonstrated the alignment between Design Thinking approaches and entrepreneurial cognitive principles.

Other studies investigate how the design process, techniques and tools might be advantageous for entrepreneurship.
Design Intech's 2016 research, which ranks startups with a valuation of $1 billion or more, states that having a designer as part of the founding team is considered an asset.
Dimov's (2016) research marks a significant milestone in the entrepre-

neurship literature, since it establishes design as a central element in the entrepreneurial process (Zhang and Van Burg, 2019). Dimov (2016) therefore aims to reopen the discussion, arguing that the recognition of entrepreneurship as a form of design not only invites questioning of the logic and methods by which academics have conventionally conducted research in entrepreneurship, but also provides an opportunity to address a problem related to the apparent incompatibility between practical relevance and scientific rigour in entrepreneurship as a field of study (Berglund *et al*., 2018).

Another important issue to consider is the practical integration of design techniques into entrepreneurial processes (Nielsen *et al*., 2017). In this case, the *Design Thinking* to which Dimov refers corresponds in fact to the connotation that design assumes in the business realm, where entrepreneurship literature views «Design Thinking as an approach to problem-solving, innovating new products and services, and to innovate business models».

Some authors suggest that Design Thinking is an effective way to introduce and establish innovation-focussed strategies and culture in small businesses. They emphasize the significance of equipping entrepreneurs with the necessary tools to redesign their businesses (Ward *et al*., 2009; Malins, 2011; Ingle, 2013). Simultaneously, multiple authors propose a revitalization in the instruction of entrepreneurship, emphasizing the significance of providing aspiring entrepreneurs with the mindsets, abilities, and methodologies derived from Design Thinking (Neck and Greene, 2011; Von Kortzfleisch *et al*., 2013; Fixson and Rao, 2014; Nielsen and Stovang, 2015). In Nielsen, Christensen *et al*.'s (2014, 2019) exploration of the relationship between design and entrepreneurship practices, they highlight that design and entrepreneurship focus on different aspects of the innovation process. However, they also propose that combining these two domains can lead to the creation of new innovations and business ventures.

Martin (2009) argues that designers have a distinct mindset, in which the limitations of an issue are not perceived as barriers, but rather embraced as opportunities to challenge preconceptions and explore novel avenues for innovative solutions. Tackling complex problems requires integration of a different logic of thought, typical of design: the abductive logic. It is important to reflect not only on

What is? and *What should be?*, but it is crucial to embrace the *What might be?* perspective. Design Thinking combines induction and deduction with abduction, analytical thinking with creative thinking. For Martin, this perspective should be addressed in studies of different disciplines. He emphasizes the significance of incorporating the design approach into management education, as it may not be sufficient to tackle modern problems. Martin also argues that Design Thinking should be placed at the core of management training, emphasizing that business professionals should not simply aim to comprehend designers better, but rather strive to become designers themselves (Dunne and Martin, 2006). Specifically, this would involve incorporating principles from Design Thinking, such as user-centredness, involvement, visualization, prototyping, iterative experimentation, learning, and multidisciplinary cooperation.

To succeed in the entrepreneurial environment, it is essential to embrace a do-then-learn approach rather than a learn-then-do one. Design Thinking enables active experimentation and learning to be the focal point of the innovation process (Beckman and Barry, 2007; Liedtka and Ogilvie, 2011). Fixson and Rao (2014) analyze how the methods of concept visualization and prototyping, as well as iterative experimentation and learning, form a compass that guides entrepreneurs in the process of building prospects. The combination of divergent and convergent thinking, along with the capacity to visualize and envision hypothetical new products and services that are not currently in existence, has the potential to generate innovative and imaginative ideas that entrepreneurs can utilize to initiate new business endeavours (Sarooghi *et al*., 2019; Val *et al*., 2019).

Nielsen and Stovang (2014) specifically examine the role of Design Thinking as a creative method for solving problems. In their study they support previous assertions made by Dunne and Martin (2006) and Neck and Greene (2011), suggesting that combining practical entrepreneurship education with the open and human-centred approaches of Design Thinking can empower aspiring entrepreneurs to systematically discover innovative solutions and shape an uncertain future (Nielsen and Stovang, 2015).

This approach involves actively engaging with people and gaining a profound understanding of their needs and perspectives.

Nielsen and Stovang (2015) argue that traditional entrepreneurship education fails to prepare students to engage with users effectively. It tends to focus on quantitative market research and segmentation based on social, psychological, and demographic categories, whereas in Design Thinking, the primary focus is to establish direct and intimate interaction with users. This involves intently observing their behaviour, tracking their actions, and attentively listening to their thoughts. The objective is to gain a comprehensive understanding of how people engage with a particular problem space.

11.4 Why Design Thinking should play a central role in entrepreneurship

In an entrepreneurial landscape where most startup innovations have for a long time been technology driven, thanks to all the characteristics expressed above, design has slowly assumed a key role in the creation of new ventures. It is no coincidence that one of the main reasons for the failure of startups is attributed by CB Insights' annual rankings to the lack of a need for the particular product or service. Technological startups very often come up with radical innovations but do not find a need to satisfy and consequently do not find a space in the market.

For a comprehensive understanding of this premise, it is crucial to refer to the CBInsights study, which examined 378 businesses (as of June 2021) and identified twelve primary causes cited by founders for the failure of their startup ventures. From the different founders who took part in the poll it was discovered that the two principal failure causes are:

1. Ran out of cash: the initial phases of the startup process are marked by a persistent lack of resources. Nevertheless, even if entrepreneurs successfully acquire funds for their business startup, they still require additional funding to support the expansion of their startup. The primary cause of startup failure, mentioned in 38% of cases, is the lack of available cash.
2. No market need: it is frequently identified as the primary issue by professionals, consultants and researchers.

> What matters for a startup is not trying to solve a problem that is interesting per se, but finding a problem that actually matters to many people. Not by chance, the motto of YCombinator, founded by Paul Graham, is *make something people want*. In 35% of cases, entrepreneurs admitted tackling a problem or need for which ultimately there was no market. Moreover, an additional cause of failure is represented by the launch of 'unuser-friendly' products and services. In other words, the startups are failing to identify the urgent needs because of a lack of direct user engagement in their development process.

An earlier study by one of the authors (Carella *et al*., 2023) analyzed the importance of Design Thinking principles in the entrepreneurial journey of people with a non-design-related background who were faced with a design-driven path to create their new startup. Table 1 is from the cited study and shows the importance of the different Design Thinking principles for the participants. Participants were asked to rate from 1 to 5 the importance they perceived in the different principles at the end of the training course, with reference to their possible use in the development of new business ideas.

The study showed that *diverging and converging* is one of the characteristics of Design Thinking that is most interesting for aspiring entrepreneurs who do not have a design background. The reason for this is that the Design Thinking process involves a phase of exploring unconventional ideas, known as the divergence stage, followed by a phase of selecting and developing the most promising ideas, known as the convergence stage (Brown 2008). The Design Thinking application sets itself apart by effectively integrating intuition and rationality to integrate knowledge patterns that are recognized through a deliberate assessment of their relevance (Stephens and Boland 2015).

Diverging and converging	Human centred design	Creative reframing	Learning by doing approach	Visualization	Holistic approach
4,13	3,77	3,77	3,51	4,29	3,51

Table 1.
Importance of Design Thinking principles during a design-driven course made for participants with non-design related background (Carella *et al*., 2023).

Design thinkers consistently and actively manage the balance between options and limitations in order to create alternative and unique solutions to important problems (Liedtka, 2015).
Another essential aspect that consistently arises is the concept of *human-centred design*. The fundamental premise of Design Thinking is human centredness, which means that the starting point and focus of the entire Design Thinking process are the users and stakeholders, and considering their needs and preferences. The method used to implement this idea is empathizing with users: empathy, as defined by Connell *et al*. (2015), involves taking into account the perspectives, perceptions, physical and emotional needs, desires, and values of others. Design thinkers can envision solutions by taking a *people first approach* and by doing so they can shift their point of view to address expressed and unexpressed challenges (Micheli *et al*., 2019). As seen above, one of the most common causes of failure for startups is *no market need*. If we think about the characteristics of Design Thinking, and in particular *diverging and converging* and *human-centred design* by reference to the above, it is evident how Design Thinking can be a valuable asset to avoid the occurrence of one of the biggest problems in the entrepreneurial world. Design (thinking) allows us to start from the user, from understanding his or her needs (both explicit and latent), placing the problem the user is facing at the centre of the process. The logic of need-oriented work gives us the possibility of often finding in advance a market space in which to position ourselves later, because recognizing the need implies that there is a need to find a way for our user to solve it. This is even more amplified by the mix of *human-centred design* with the logic of *diverging and converging*. This gives us the possibility of generating different options that allow us to evaluate more alternatives and provide a more careful response to the starting problem. Furthermore, we have seen how another cause of startup failure relates to the *run out of cash*.
Over time, we have seen how this also has to do with mismanagement of funds. Startups often arrive into the market and have to create their own space, thus spending more money trying to position themselves. Once again, knowing the problem well, the related need, and the type of user manifesting these needs can enable the development of targeted actions that can reduce uncertainty.

The last cause of failure that was mentioned earlier concerns the *unuser-friendly* products and services. The lack of direct user engagement and testing also results in difficulties accessing and even using the solutions. This translates into poor understanding of the users' willingness or ability to pay which impacts the startups' pricing strategies. All of which impacts their cashflow and ability to sell their products (running out of cash more quickly impacting their need for more funding). The Design Thinking way of proceeding can be very beneficial in avoiding these causes.

It is evident how the use of Design Thinking and its properties can take on a fundamental role within the entrepreneurial process. If we were to schematize what happens typically in the *classic* entrepreneurial process, founders start with an idea, on which they concentrate all their forces to proceed with development. However, when they arrive at the end of the process they encounter various problems that make it difficult to reach the market.

A *design-driven* entrepreneurial process, on the other hand, reverses this logic, putting the *chaos* at the beginning of the process, in order to search for the best possible solution that responds to the identified problem and meets the identified needs. By the time they

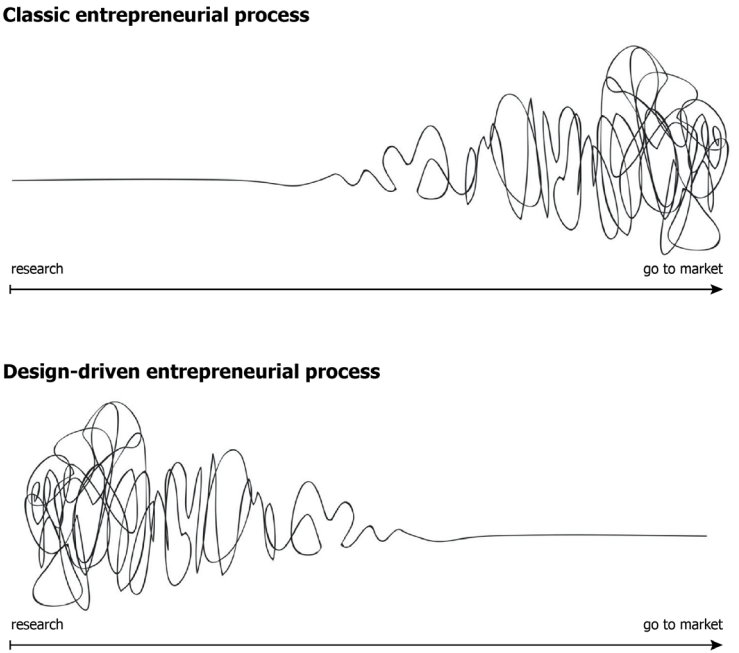

Figure 1.
Different perspectives on the linearity of the process between the *Classic* entrepreneurial process and the *Design-driven* one.

reach the market, the process presents far fewer problems, with a much higher chance of success (Figure 1).

Given the importance of innovation for the development of different countries, discussed at the beginning of the chapter, design (thinking) should be a major lever in transformation and innovation plans. Indeed, the characteristics of design (and Design Thinking) highlighted here are not only valid within the boundaries of the entrepreneurial world. There are numerous studies (see, for example, the 2018 McKinsey Quarterly study – *The Business Value of Design*) that show how using design-driven methodologies within organizations can lead to significant competitive advantages. Design Thinking has been shown to have positive benefits on organizational change and innovation (Brown, 2009); better decision-making (Liedtka, 2015); client orientation (Kumar and Whitney, 2007); and competitive advantage (Martin and Martin, 2009). There is considerable evidence to suggest that design should increasingly play a central role within different types of organizations to offer more definitive and customized solutions and enable them to position themselves effectively in the market, bringing differential value.

In a global landscape characterized by uncertainty, design-led transformations can therefore help focus innovation efforts, and reduce efforts and energies that are often unfocussed and do not lead to meaningful change.

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