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The dynamics of emergent entrepreneurship: a retrospective analysis of properties and possibilities for inference by conceptual blending of competencies and opportunities

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Abstract

This study re-evaluates dominant entrepreneurship theories, arguing that founders' competencies often have a stronger influence on knowledge-based start-ups than market opportunities alone. Through an empirical examination of the start-up processes and growth patterns of 32 of Denmark's leading developing, manufacturing, marketing, and selling firms, we demonstrate that the emergence of these enterprises relies on founders' competencies blended with societal opportunities, and that sustained growth follows through subsequent integrations of competencies and opportunities as a second blend. The first blend with start-up is not crucial for progressivity but for learning, where the second blend of subsequent ones is crucial for creating the foundation, momentum, and survival. These findings contribute with an alternative perspective that blends a competency-focused approach with an opportunity-centric view for start-ups. This integrated perspective reveals how new characteristics and opportunities emerge through the dynamic interaction and interplay between various elements in the entrepreneur's environment and their personal competencies. In essence, this study aims to understand how the interplay between an entrepreneur's competencies and the opportunities they encounter leads to the emergence and evolution of new ventures. By analysing this process retrospectively, it seeks to uncover patterns and insights that could inform future entrepreneurial efforts and research.

Keywords Start-up, Entrepreneurship, Emergence, Competences, Opportunities, Blending theory, Conceptual integration, Reflective analysis, Vertical innovation

Theories guiding entrepreneurs' start-ups and growth

The paper will begin by introducing current trends in the theories offering guidance to prospective entrepreneurs, as well as relevant theoretical frameworks, especially on "blending", that underpin the analysis and proposals presented in this article.

In the studies of what triggers entrepreneurship academics from various theoretical fields have perceived and explained entrepreneurship phenomenon in different

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complementary ways leading to different dominance of theories over the course of history (Simpeh, 2001; Turcan and Fraser, 2018). Nielsen et al. (2009) suggest 4 historical waves: (1) Economic wave, where the entrepreneur plays, e.g., a liaison, risk-taking, or renewing role in the business economy, (2) the social-psychological wave, starting in the 1960s, focused on which personality traits of the entrepreneur (and later of a start-up team) would work the best, (3) the emergence wave (around 1990s) focused on how the entrepreneur was creating a new organization, and (4) the opportunity wave sees the renewal through innovation and opportunity identification and exploitation as the core of the entrepreneurial process.

We dare say that none of these historical waves appear to have a strong focus on the role of the competencies as the driver of the start-up process. In their article Nielsen et al. (2009, op.cit.) have their focus on the complementarity of opportunities and emergence, neither having competences as an important driver of start-ups.

Entrepreneurial practice is inherently complex and dynamic, often characterized by opportunistic decision-making and idiosyncratic processes. To fully grasp its intricacies, a singular theoretical approach may prove insufficient. Our research corroborates this notion, highlighting the necessity for applying more theoretical frameworks. We draw mostly on the resource-based (e.g., competences), opportunity (in a broad sense), and emergence perspectives.

In recent years, theories and approaches offering guidance to start-up practices—such as agile methodologies, lean start-up, design thinking, and business modelling—have significantly influenced the field of entrepreneurship (Gertsen et al., 2018). While these frameworks emphasize market adaptability, customer value, experimentation/failure, and iteration in the process, we argue that they often overlook or underestimate the role of foundational competencies, particularly in technology and experience-based entrepreneurship. Effectuation theory (originated in learning theories and empirical observations) stands out by centring on the entrepreneur's competencies, identity, and network as essential starting points blended dynamically with evolving opportunities (Sarasvathy, 2003, 2021). Sarasvathy (2001) contrasts effectuation and causation, with the latter describing a goal driven predictable startup process.

This paper has similarities with the effectuation theory as we are suggesting that competencies can serve as the primary driver of start-up success, with market opportunities complementing rather than leading this process.

Historically innovation theories have shifted from “technology push” to “market pull” models, emphasizing market alignment. Later perspectives, however, incorporate broader social, environmental, and networking considerations (Rothwell, 1992; Tidd, 2006). A recent contribution from Bill Aulet's *Disciplined Entrepreneurship* (Aulet, 2013) offers a structured framework for innovation-driven startups. While the book touches on competencies, its 24-step process primarily focuses on developing market opportunities (speculatively, Aulet's approach may aim to complement the often technology-heavy focus of MIT students and staff). This approach aligns with the Lean Startup Methodology, pioneered by Eric Ries (2011) and Steve Blank (2006), which originated in software development. The Lean Startup Methodology emphasizes early customer engagement and rapid hypothesis testing to validate market assumptions. This approach prioritizes iterative product development and customer feedback over extensive planning, allowing startups to adapt quickly to market needs. Similarly, the Business Model Canvas,

introduced by Osterwalder and Pigneur (2010), and its variations maintain this market-oriented focus. This visual tool helps entrepreneurs map out key elements of their business model, emphasizing customer segments, value propositions, and revenue streams.

While these influential methodologies provide valuable frameworks for market validation and business model development, they tend to place less emphasis on cultivating specific entrepreneurial competencies. Instead, they prioritize a customer-centric approach, encouraging startups to build products that align closely with market demands and to iterate rapidly based on user feedback.

Human-centred approaches, such as design thinking, prioritize creating solutions that are desirable, feasible, and viable. However, like other innovation methodologies, they tend to focus more on identifying opportunities rather than leveraging existing competencies. This emphasis can present significant challenges for technology-based entrepreneurs in the manufacturing sector, where success often hinges on specialized skills and knowledge acquired through years of experience and continuous learning.

For technology-driven manufacturers, striking a balance between exploring new opportunities and capitalizing on core competencies is crucial. We assume and investigate if a more ideal approach would integrate the innovative spirit of design thinking and other market-oriented methods with a deep appreciation for the technical mastery and operational excellence that define successful manufacturing enterprises. This balanced strategy can lead to innovations that are not only desirable and marketable but also grounded in practical, implementable expertise.

Blending competences and opportunities

In addition to examining the foundations of start-ups, this study also explores the specific blend of competencies and opportunities that emerges during scaling. We will propose that “blending theory,” from cognitive linguistics, offers an effective framework for understanding how competencies and opportunities interact in entrepreneurial growth. According to Fauconnier and Turner’s (2002) theory of conceptual blending where disparate knowledge domains combine to produce novel outcomes is a concept valuable for explaining entrepreneurial growth as an iterative blending of competencies and market opportunities. Thus, conceptual blending is a cognitive operation in different brains that combines elements from different mental spaces to create new, emergent structures.

In his book “Innovation and Entrepreneurship” Drucker (2006) describes seven general sources of innovative opportunities. The “mental span” that these sources of innovation describe can appropriately be understood through the lens of conceptual blending (Mohr and Sarin 2008). Four company-internal: (1) The Unexpected: Unexpected successes, failures, or external events, (2) The Incongruity: Discrepancies between reality as it “actually is” and reality as it is assumed to be or “ought to be”, (3) Process Need: Innovation based on the need to improve or redesign existing processes, (4) Industry and Market Structure Changes: Unforeseen changes in industry or market structure, and three external sources: (5) Demographics: Changes in population size, age structure, composition, employment, educational status, and income, (6) Changes in Perception, Mood, and Meaning: Shifts in how people perceive, feel about, and interpret things, and (7) New Knowledge: Both scientific and non-scientific knowledge that can lead to new products or services.

Although Arthur Koestler introduced many ideas regarding blending in his 1964 book *The Act of Creation* (Koestler, 1994), the specific concept of “blending theory” was formulated later by Turner and Fauconnier (1995) in their article *Conceptual Integration and Formal Expression* and further developed in their 2002 book *The Way We Think*. Turner and Fauconnier argue that many cognitive operations involve integrating diverse mental structures into a unified representation, enabling the human mind to organize new information within mental spaces. They term this process “blending” and the resulting output a “blend.”

Blending theory, also known as Conceptual Blending Theory (CBT) or Conceptual Integration, is now a cornerstone of modern cognitive linguistics with significant influence on cognitive science. Beyond traditional creativity tools like brainstorming, blending theory plays a central role in approaches involving assumptions, metaphors, and similar techniques, often essential in achieving innovations such as patents, which frequently combine two familiar domains to produce a novel and surprising effect. The theory also holds key implications for semantic theory (Oakley and Pascual 2017) and has become integral to cognitive modelling and computational creativity, particularly in advancing artificial intelligence (Falmer and Plaza 2019). In the popular literature Steven Johnson’s book “Where good Ideas Come From” (Johnson, 2010) has created attention and practical impact based on essentially the basic principles of blending.

Research question and research design

Background and context

The authors of this article bring extensive practical and theoretical experience in entrepreneurship and start-up activities, particularly in high-tech, research-based, and production-intensive sectors. This background has led to questioning the current dominant practices in entrepreneurial guidance, which we find inadequate in certain contexts. We observe a particular challenge in areas with long incubation phases, such as start-ups based on scientific research or deep industry experience. Historically, many companies have achieved growth with less initial focus on market opportunities than current guidance suggests.

Purpose of the analysis

From an innovation perspective, we aim to identify patterns in how the most successful companies (defined here as the largest survivors) were created, achieved progress, and established defences against bankruptcy. Our analysis focuses on the largest Danish industrial companies, examining their innovation approaches from start-up through continued growth phases and thereby retrospectively identify best practice by learning from the experiences of others and implementing successful methods for entrepreneurial practice.

This investigation has raised questions about whether current mainstream recommendations for start-ups overly emphasize market analysis with value proposition at the expense of competency-based approaches.

Research objective

Our objective is to decode the preferred emerge and grown of these successful Danish industrial companies and place them within an innovation context. This analysis aims to

offer a supplementary framework for new manufacturing start-ups, potentially challenging or complementing current dominant guidance on the development of technology-based manufacturing companies.

Research question

How do the innovation strategies of successful Danish industrial companies, from start-up through growth phases, differ from current mainstream entrepreneurial guidance, and what implications does this have for guidance of scalable start-ups?

This question encapsulates the core focus of the research, addressing the potential gap between observed successful practices and current entrepreneurial guidance, particularly in the context of technology and manufacturing start-ups.

Research design

The research examines 32 manufacturing-oriented companies from a list of the 100 largest Danish companies. The largest company are defined by the Danish Board of Business Development (Erhvervsstyrelsen, 2020) in terms of employment and turnover.

The criteria for selecting the companies were that they are technology, product, or service-oriented including (some kind of) production and that they are the largest or among the largest manufacturing companies in Denmark. The resulting list of 32 companies are analysed in relation to their basis for start-up, their first movements, and where the transformations have taken place.

Selection criteria and composition of Danish top 100 companies The selection is based on a review of the 100 largest companies in Denmark, defined by turnover and number of employees. This definition aligns with the Danish Auditors Act's classification of Public Interest Entities (PIE). The list is compiled using information from the most recently published annual reports as of September 1, 2020. Companies whose primary activity is holding shares are excluded from this analysis.

Besides the 32 industrial companies, the list of 100 includes: Banks (4), Engineering consultants (7), Insurances (6), Services (17), Trades (23), and Transports (11). It's worth noting that our definition of industrial companies also encompasses service companies with manufacturing activities.

The 32 industrial companies are further classified based on their ownership structure. Listed companies (joint-stock) and the two special Danish forms of ownership: AMBA (cooperative) and—as part of “Private ownership”—a special Danish form of fund-ownership, where the fund is created by the founder and where (s)he is the main shareholder or has a decisive influence on the company. The ownership of the listed 32 industrial companies' area: Joint stock (12), private (16), and cooperative (4). Table 1 present a list of the investigated companies as being organisations with both development, manufacturing, marketing and sale.

The list of the largest companies varies from statistic to statistic depending on what is measured, such as turnover, profit, number of employees, time of calculation, etc. This list is based on the official annual report from the Danish Board of Business Development. Variation is not included as a critical factor, as it is not the numbers or size that are decisive for the analysis, but the emergence and development. The full list of all

Table 1 The companies investigated

Company	Area	Turn over	Employed	Established
		<i>mia €</i>		<i>(year)</i>
Arla Foods Ingredients Group P/S	Dairy	10.3	18.765	1881 (S), 1882 (DK).
BESTSELLER A/S	Textile	3.1	17.000	1975
Brødrene Hartmann A/S	Packaging	0.35	1.500	1917
Carlsberg	Beer	8.9	40.000	1847
Chr. Hansen A/S	Food ingrediens	0.86	3.000	1874
Coloplast A/S	Medico	2.5	12.500	1957
Danfoss A/S	Industry Energy	5.2	40.000	1933
DANISH CROWN A/S	Food company	3.1	6.300	1887
DLG a.m.b.a.	Yeast	6.7	6.600	1898
DuPont Nutrition Biosciences ApS	Ingrediens food	0.45	6.880	1872
FLSMIDTH A/S	Industry turnkey	2.4	13.000	1882
GN Hearing A/S	Mechanical Engineering	2	6.000	1869
Grundfos A/S	Industry water	3.5	19.210	1944
H. Lundbeck A/S	Medico	2.3	4.980	1915
Haldor Topsoe A/S	Chemistry	0.75	2.300	1940
ISS Facility Services A/S	Facility management	10.6	534.200	1901
LEGO System A/S	Toys	19.2	19.000	1932
LEO Pharma A/S	Medicin		5.700	1908
LINAK A/S	Mechanical Engineering	0.5	2.200	1907
Maersk A/S	Shipping and production	32	87.700	1886
Marius Pedersen A/S	Waste handling	0.2	4.700	1925
Nielsen A/S	Cleaning	1	5.800	1906
Novo Nordisk A/S	Medicin	18.8	45.300	1923
Novozymes A/S	Enzymes	1.4	5.825	1925
Oticon A/S	Medtec	2.5	18.100	1904
Rockwool International	Insulation	0.4	11.600	1909
Royal Unibrew A/S	Beer	1	2.800	1989
Siemens Gamesa Renewable Energy A/S	Energy	3.5	6.300	1980
Tulip Food Company A/S	Meat	0.7	1.550	1887
VELUX A/S	Construction	3	11.500	1941
Vestas Manufacturing A/S	Energy	12.1	17.250	1898
Widex A/S	Medtec	0.25	3.800	1956

Source Danish Board of Business Development. Turnover and approximate numbers of employees are retrieved from the companies' websites, which can vary in different setups depending on what is included as being part of the organization. These numbers are not used in the analysis but have been the basis for selecting the company

companies of top 100, January 2020 in shown in Appendix 1, and of the 100 companies 32 has an industrial character with development-, manufacturing-, marketing- and sale activity.

Data collection and analysis methodology The data for the analysis of each company data has been collected from various multiple sources such as the company's homepage, historic descriptions, books regarding the creator, articles regarding the foundation, insight from the authors previous collaboration with the companies etc. As these huge companies also have had a major impact on society and especial the local community, the origin and development are well described in secondary sources.

The dataset encompasses historical information regarding the companies' origins, including:

- Initial competencies and opportunities at startup
- Significant milestones in their innovation journey up to 2020
- Year and location of establishment
- The entrepreneur's background
- Industry classification and ownership structure

This comprehensive data is analysed to identify patterns among successful companies and extract reproducible lessons. The findings are then deductively expanded through

case studies of each company to explore the emergence as start-ups activities, repositioning them within the broader context of growth and surviving.

Each industrial company in the study undergoes a thorough examination, focusing on:

1. The origin and background of the initiator
2. The context of the company's establishment
3. The rationale behind the chosen startup area, considering:
 - General societal structures and movements leading up to the startup period
 - Other explanatory factors such as crises, wars, economic depressions, and personal experiences

These aspects are often well-documented in biographies, books, and articles about the founders—a rich source of information available for many of the largest companies, which also to some extent provides possibilities to triangulate. Finally, the analysis explores how and where these companies have expanded their businesses over time. This comprehensive approach allows for a nuanced understanding of the factors contributing to the long-term success of these industrial enterprises. The qualitative and quantitative data for each company and their motivations are shown in Appendix 1.

Analytically, choosing the largest companies has several advantages: They have demonstrated their ability to start, to scale and to survive, just as the companies in terms of their position are described in detail through biographies, articles and statistics. The downside is obviously missing out on the learning from failure.

Analysis and findings

Among Denmark's 100 largest and still existing companies, 32 meets the criteria for inclusion in the analysis and their primary activity were analysed. The founders were mostly engineers and craftsmen, followed by farmers, scientists, and business people. All 32 were founded in areas where the initiators possessed deep knowledge from education and/or experience. The analysis of the founders' backgrounds (Fig. 1) showed that their professional background coincided with experience, which collectively represented the founders' competencies.

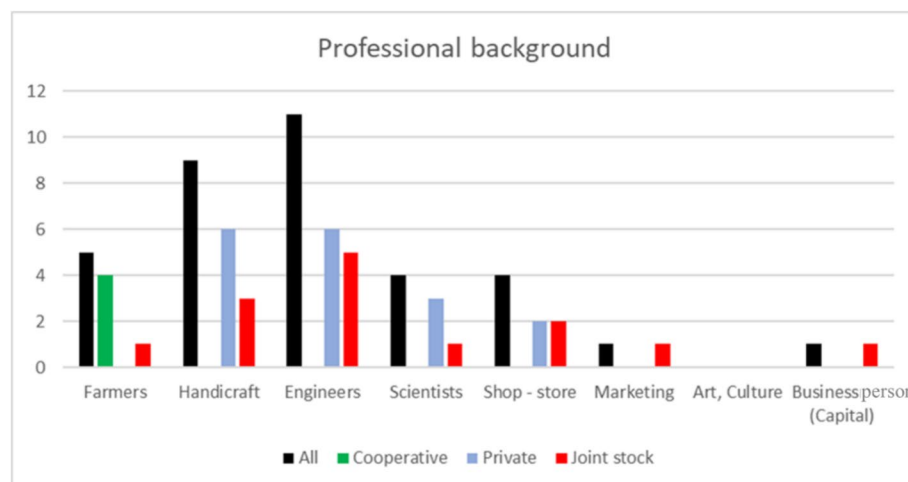


Fig. 1 The educational and practical background that the creator of the company has achieved. Colours indicate the companies' ownership structure

Background as a competency concerns more than just one's profession, as it also concerns what the entrepreneur has worked on to gain empirical knowledge—special experience-based competency. This is shown in Fig. 2.

At the time each company was founded, there were significant social changes and movements in the society, many of which influenced the early practices of businesses. Some of these customs and subsidy schemes were immediately recognizable and directly tied to the emerging business landscape. However, other societal shifts were harder to grasp at the time, as their opportunities and impacts were not immediately clear, often becoming fully understood only in hindsight.

Another factor came from the local community, often rooted in family ties. In many cases, personal circumstances—for instance related to illness among loved ones—motivated entrepreneurs to act, aiming to make a positive impact on those closest to them.

Opportunities in the society and competences for utilization of this in first blend

For all 32 establishments, competence has been a critical factor; however, competence alone is not sufficient for initiating a start-up. Most individuals possess specific skills that they apply in their daily work across various domains such as production, administration, development, teaching, and management. However, without aligning these competencies with available opportunities and actively pursuing them, entrepreneurship does not materialize. While changes in the external environment, society, and market conditions occur constantly, only a few of these shifts inspire the creation of new businesses.

It is not all competencies which are used for a start-up. At the same time, it is not all opportunities that are used as a subject for start-up activity even one might have the competencies. Many even great opportunities have not been able to be exploited, of course, because there has not been a strong enough competence to dazzle with. Similarly, there are opportunities for many brands to be created based on the same opportunity, for example as the situation was at the end of the twentieth century in Denmark.

Figure 3 illustrates the analysis of opportunities that have laid the groundwork for leveraging the competencies of the founder(s).

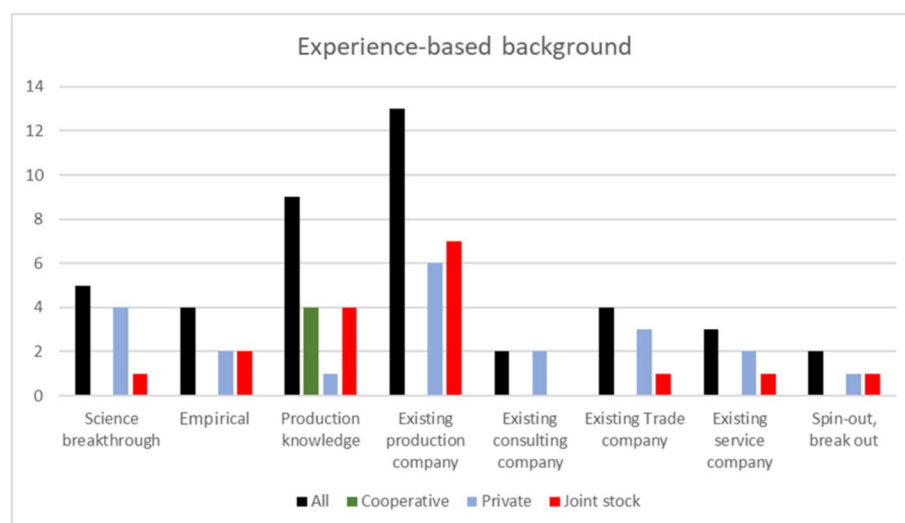


Fig. 2 The experienced and acquired knowledge that the creator of the company has achieved as the basis for its competence. Colours indicate the companies' ownership structure

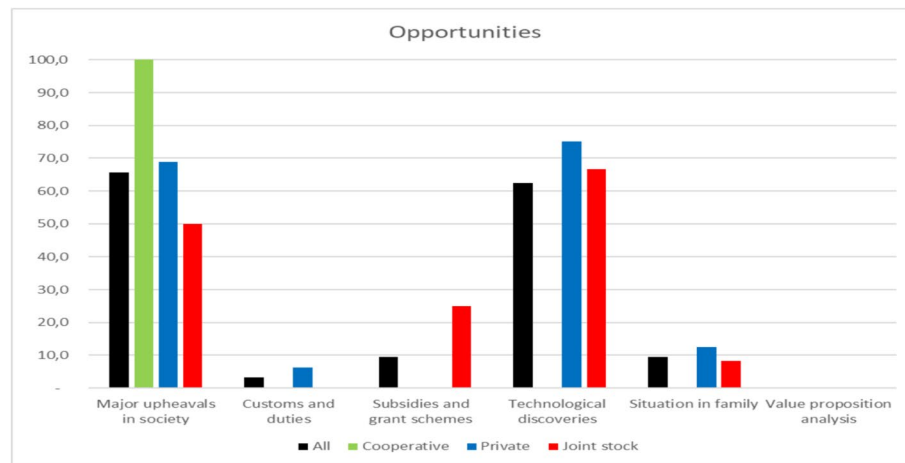


Fig. 3 Opportunities in the milieu (Marinova and Phillimore, 2003) with the area of observed opportunities. Colours indicate the companies' ownership structure. The black one shows the average

Most established companies have emerged in response to societal upheavals, such as urbanization, energy crises, and shifts in consumer purchasing habits, including changes in fashion trends. Technological advancements have also played a significant role—not initially through the creation of new products or processes, which can be acquired, but through opportunity-rich discoveries. Examples include the ability to control refrigeration units and heaters, cultivate pure yeast strains, develop sugars and molasses from beets, amplify sound, transform sand and stone into insulation, and incorporate plastic into various products.

For centuries, Danish farmers produced substantial amounts of grain, which was used both for local beer brewing and export. However, at the end of the eighteenth century grain prices came under pressure due to competition from imports and soil depletion caused by years of overproduction. Despite their long-standing expertise, the industry faced significant challenges. In West Jutland, with its sandy soils, farmers shifted to cattle farming, leveraging their existing knowledge of large-scale butter production for export—a strategy born out of necessity. Meanwhile, in East Jutland, where the soil was more fertile, farmers collaborated to process pork, focusing on the production of classic bacon for export, particularly to England. They also formed cooperatives to secure fertilizer supplies. These developments were partly driven by economic crises, forcing farmers to innovate, but real growth only materialized later. The emergent startup was not based solely on new competencies or emerging needs, but rather on competencies as part of emerging opportunities in society, in cultural conditions or technologies, which at this time when the industrial revolution also reached Denmark, and the Nordic countries had a decisive influence (first blend).

Other sectors, such as fishing and forestry, faced similar pressures and opportunities during that period. However, the alignment of skills and opportunities necessary for entrepreneurial ventures did not occur, resulting in missed potential.

While cooperatives were typically formed around shared experiences and small-scale local production, many companies were founded based on deep, specialized expertise or scientific and technological knowledge. A notable example is Novo Nordisk, co-founded by Schack August Steenberg Krogh—a zoologist, physiologist, and professor of animal

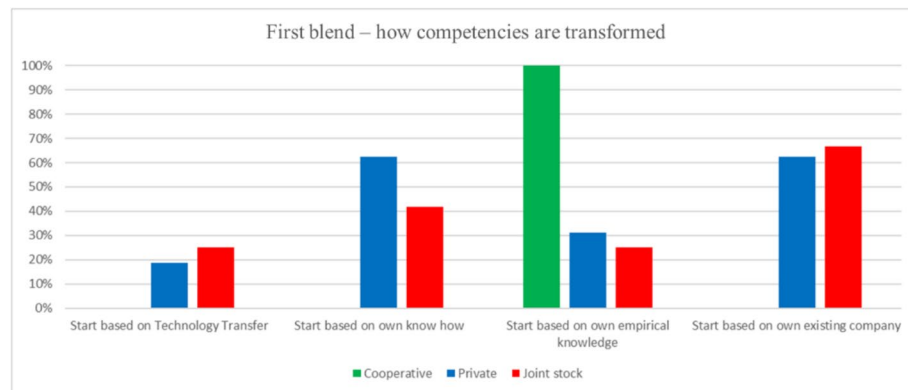


Fig. 4 What made the competencies become something useful for a start-up

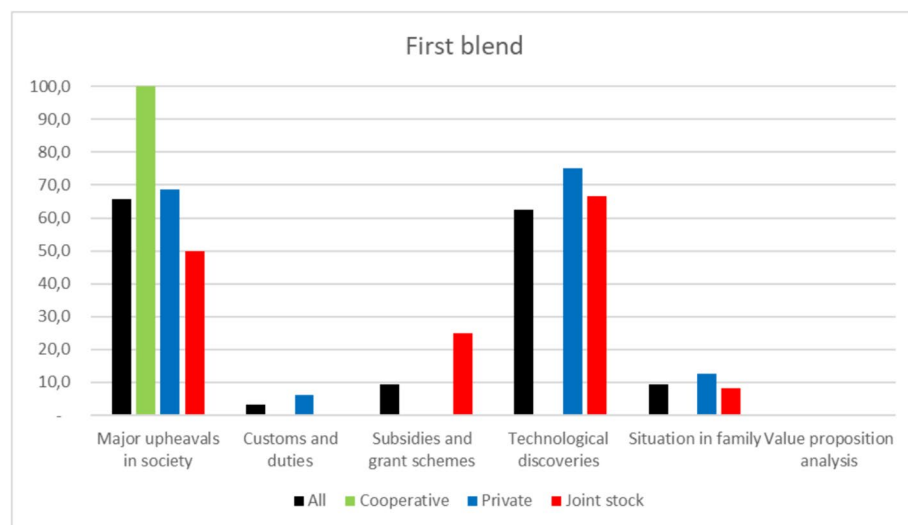


Fig. 5 What are the opportunities for the first blend based on

physiology. Krogh, who won the Nobel Prize in Medicine in 1920, is renowned for his contributions to modern occupational and sports physiology.

Krogh's interest in diabetes was sparked when his wife was diagnosed with Type 2 diabetes. During a research trip to the United States, he secured the rights to produce insulin for the Nordic countries, granted by Frederick Banting, Charles Best, and John Macleod (the latter two had won the Nobel Prize for the discovery of insulin). Initially, insulin was derived from a purified extract of a calf's pancreas, known for its brownish substance. Later, the insulin was extracted from pig pancreas, as pig insulin closely resembles human insulin—a fortunate match given Denmark's abundant pig population. It was only many years later those advances in biotechnology allowed to produce insulin using genetically engineered yeast cells.

Despite Krogh's deep scientific knowledge, the company's success was initially built on insourced technology, blended with options in the market discovered by a personal need.

Where Fig. 3 shows the contemporary trend for possible entrants, this is only exploited when the competencies of a potential entrepreneur are matched as shown by first blend Fig. 4 and the emergent factor for, e.g., the state to initiate shown Fig. 5 (can be based

on several at the same time) as being the basis for competencies and opportunities to be blended as the basis for a start-up. Many have competencies and changes in society and culture affect everyone, but not everyone exploits this even though a pattern is shown. The land reforms in the late 1800s created widely branched agricultural cooperatives—but not everywhere, technological opportunities within sound processing gave impetus to many parallel hearing aid companies, the energy crisis gave rise to many parallel wind turbine companies, etc.

Technological discoveries and advancements—though not always unique or patented products or methods—often served as global insights that were sometimes adapted by scientific and technological universities in Denmark. When these insights aligned with local competencies in Denmark, they created opportunities that were well-timed for exploitation. In some cases, this initial synergy did not result in immediate patents. However, subsequent iterations (the 2nd and 3rd blends) led to the development of multiple patents, contributing to significant growth over time.

Taxes and duties have created some opportunities, but only to a very limited extent. Similarly, funding schemes have not had a significant impact, which contrasts with the prevailing belief in recent years within the field of entrepreneurship scholarship that financial support plays a crucial role. An exception where such support has been notably impactful is the wind turbine industry although it remains debatable whether this was primarily due to subsidy schemes or the broader industry context. Most Danish wind turbine manufacturers have their origins as traditional machinery suppliers to the agricultural sector, which faced a crisis in the 1960s due to severe increases in production efficiency. It is unclear whether this shift was driven more by the agricultural sector's downturn or by the support schemes introduced during the 1970s energy crisis—it was likely a combination of both factors. Additionally, the development of the wind turbine industry was strongly influenced by Denmark's cooperative tradition, which fostered networks of pioneers like Nordtank in Djursland and Tvind in West Jutland. Thus, the foundation of the wind turbine industry was built through a mix of private enterprise and cooperative initiatives. Today, however, it has evolved into an industry dominated by joint-stock companies, experiencing significant growth through mergers and acquisitions holding leading positions in the global industry.

Finally, personal touches have had meaning and importance to entrepreneurs—wanting to help someone close to you. This is, e.g., the wife who has hearing problems, the wife who has an illness (diabetes 2), an uncle who could not sell his manufactured goods, etc.

For all companies studied, start-ups have been plagued by low growth at the beginning, great uncertainty in terms of market (new markets) and technology (based on other companies' technology or relatively immature technology platform). Similarly, a large part of the companies studied have had strong competition with simultaneous activities both nationally and internationally (imports). For example, when Carlsberg was among the first in Denmark to start producing beer according to Bavarian style (bottom fermentation) as an imported brewing technique in 1847, this was innovative in Denmark, but others did the same. From 1875 to 1890, 28 new breweries opened in Denmark alone, producing Bavarian beer according to the South German tradition, around the country, and almost all market towns had their own brewery. Around 1900, there were approximately 1000 breweries in Denmark. Today, Carlsberg is the world's

3rd largest brewery conglomerate based on first blend (technology of bottom fermentation and need for a lot of cheap beer due to urbanization), but unlike most other breweries in Denmark, it has grown through second blend and survived through 3rd, 4th, etc. blend.

Beyond the startup—creating the basis for growth by second blend

The startup formed by blending competencies and opportunities is merely the beginning—“a start”—and does not directly contribute to the long-term growth of the company or serve as the foundation for its current market position.

Growth results from the implementation of a second stage of blending, which is distinctly different from the initial phase. This shift occurs partly because competencies have been enhanced through the learning gained during the startup phase, and partly because the ability to identify and capitalize on new opportunities has been strengthened. Therefore, the type of innovation that emerged during the second blending phase aligns more closely with what Rothwell (1992) described as 3rd generation innovation. This form of innovation is achieved through the integration of multiple elements within the system, network, and environment around the company (Kunze et al., 2011; Tidd, 2006).

Explaining the results in Fig. 6 is based on a vertical approach including several aspects other than the product market (Keeble and Wilkinson 2000). Jakobsen et al. (2012) describe developing verticals as a complementary innovation system to the narrowly oriented horizontal innovation with a focus on a technology or a need (Brix et al., 2013). The element in the vertical chain consists of 8 elements defined by the area in Fig. 6, there innovation a second blend is based on several aspects in the vertical chain. The first and second blend also aligns with the historical development of innovation approaches as described earlier (Rothwell, 1992; Tidd, 2006) since it is often elements of pull or push (Arnold et al., 2010) but narrowly focused, where later developments, realizations and explorations are based on broader processing involving more elements in the vertical chain. As seen in Fig. 7, the first blend is most often initiated by product

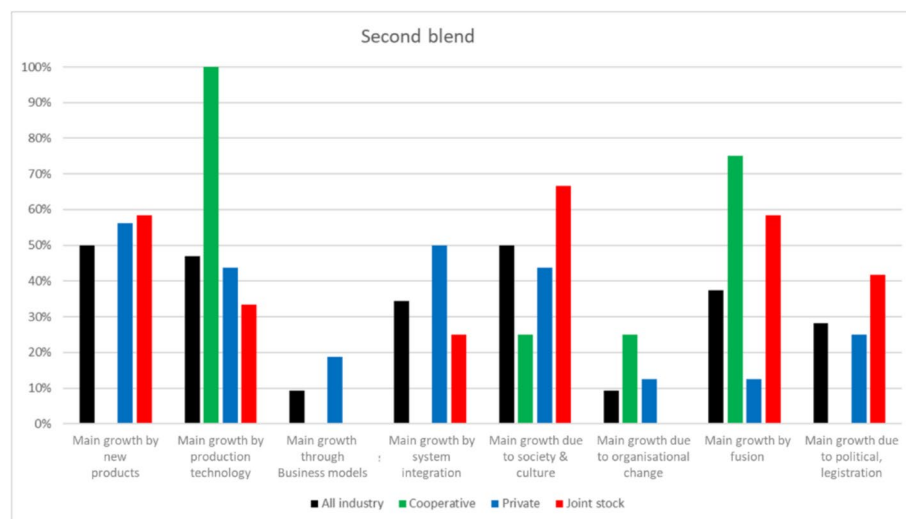


Fig. 6 Second blend—the growth. The black pillar shows the overall average



Fig. 7 Comparison of first and second blend in relation to vertical innovation

or/and technology, for cooperatives by process innovation, while for the second blend a completely different multi-spectrum picture is seen.

Therefore, in the analysis, the area for major observed innovations in the companies is placed in the vertical innovation models in the eight described areas (e.g., Jakobsen et al., 2012; Brix and Peters 2015). Innovation that leads to growth is not based on only one area in the vertical chain but in a combination of several (Keeble and Wilkinson 2000; Jakobsen et al., 2013; Brix and Jakobsen, 2014; O'Connor et al., 2020).

We have investigated how many levels has been innovated in the vertical chain in the first and second blend respectively and this is shown in Fig. 7, where ownership, including management hierarchy and decision-making system, has significant influence and is reflected in how different types of innovation shine through.

Significant differences exist between the first and second blending phases. In the first blend, innovation occurred in only a few elements of the vertical chain, averaging 1.59

out of 8 areas. In contrast, the second blend involved innovation across a substantially greater number of areas, with an average of 4.16 out of 8 areas.

A notable example is MAERSK, a shipping and production company originally established by a sea captain who purchased a steamship for transporting merchandise, established at the time as a Danish hotbed for shipping in competition with others in the South Funen and Funen archipelago (now a UNESCO Global Geopark), and first later moved to Copenhagen. Over time, he acquired additional ships, leading to the creation of a shipping company rooted in his expertise as a seasoned mariner. Later, his grandson conceived the idea of transporting merchandise in containers. Despite comprehensive analyses conducted at what is now known as Copenhagen Business School, deeming this business model unviable, A.P. Møller as the owner of MAERSK defied these conclusions and pursued the concept, financing it personally unchallenged by others' justifications for the unreasonable and impossible.

In hindsight, this bold decision proved to be highly visionary, though it required extensive transformations, and Maersk is today the world's largest container shipping company measured by capacity and turnover. The shift to containerized transport necessitated the development of new types of ships, which Maersk constructed in its own shipyards, as well as the creation of integrated port facilities designed specifically for handling containers, new business models etc.

MAERSK has consistently been a trailblazer, leveraging its resources and expertise to initiate transformative ventures. Beyond shipping, the company has expanded into diverse sectors, including banking (as a co-owner of Danske Bank), retail (co-owning Dansk Supermarked), healthcare (medico companies), and technology (IT companies).

Transformation means a conversion or radical change and is used in several sciences, for example the discovery of gravitational waves and the understanding of space–time, the digital transformation with interaction and communication, IoT with the collection and analysis of data and most recently artificial intelligence and machine learning for the analysis and processing of data. Even in biology often referred to as being about gradual changes over time as evolutionary, there are also examples of more revolutionary changes such as genetic engineering including CRISPR with the ability to precisely and efficiently edit genes, synthetic biology with the design and construction of new biological parts, devices and systems including the creation of artificial DNA and entire organisms with synthetic genomes.

All the companies surveyed have been exposed to at least one transformation or radical innovation, some to a greater or lesser extent. A transformation in a company is a comprehensive and fundamental change in the company's structure, processes, culture or business model. It is a deep change process that goes beyond ordinary adjustments and adaptations and can occur in sub-areas and concern the entire organization. A successful transformation can result in a more agile and adaptable company that is better equipped to handle future challenges and opportunities, conversely, bankruptcy is also a transformation.

Transformations in organizations are not defined quantitatively in annual reports but are derived for each of the analysed companies qualitatively based partly on their historical description on websites, partly on described profile books published about the companies' founders. The basis for the listing Fig. 8 appears from the list in Appendix 1.

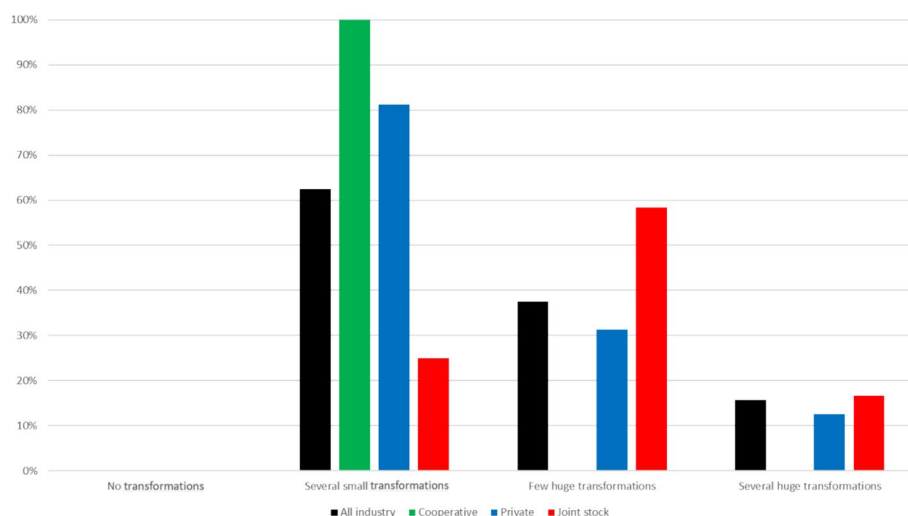


Fig. 8 Level of transformation in the companies

Radical innovation often serves as the foundation upon which a company is established during the first blending phase. The second blending phase typically builds upon radical breakthroughs across multiple domains beyond product development. In all the companies analysed, there has been a consistent departure from their original foundation, involving varying degrees of transformation. Most have undergone several minor or a few major transformations, while only a handful have experienced multiple significant upheavals—akin to what Marinova and Phillimore (2003) describe as evolutionary models in their 5th generation innovation framework.

Additionally, it appears that implementing radical and transformative innovation is generally more feasible in private companies where management is either owner-driven or operates under an ownership-based fund structure.

The role of urbanisation and universities

To investigate how the companies have pursued advanced knowledge and competences we analyse how the startups were in relation to Danish universities.

Since approximately year 1850, 20% of the citizen in Denmark have been living in the capital Copenhagen, and it has been stable ever since. Due to urbanization, it is primarily in the provincial towns that there has been growth with the first wave in the late nineteenth century and second markedly after the 1960s.

In the first wave, educational institutions were solely centred in the capital Copenhagen. The established companies created at the end of the nineteenth century were strongly influenced by people from the province who moved to the capital for studying—this is where they created their companies—and stayed there. Approximate half of the population lived and lives in Jutland and Funen, which does not reflect the location of the companies today. The first Society Change occurred from the mid to late nineteenth century, when both the percentage of the population and the actual number of inhabitants in Copenhagen as a province (all provincial cities together were the same size as Copenhagen) increased dramatically, which created a larger city and a completely different demand and need for goods and services. Despite a sharply reduced percentage of inhabitants in the countryside, there was also population growth in the countryside

due to a generally strongly increasing population. A very large proportion of entrepreneurs—especially technology-based and to a lesser extent process-oriented, have an engineering or scientific background (see Fig. 1), and despite growing up in very different places in Denmark, companies are either established in Copenhagen in connection with the entrepreneur's education or moved to Copenhagen by 2nd blend to attract qualified labour (Fig. 9).

A shift in this pattern occurred when engineering schools and universities began to appear in the provincial towns, first in Central Jutland Aarhus in 1928 (under resistance from certain parties in Copenhagen), in Odense (Funen) in 1966, and in Aalborg (North Jutland) in 1974.

By looking at the entrepreneur's birthplace, where the company is established and where the company has its headquarters today, this pattern is seen, shown in Fig. 10. The capital Copenhagen has fewer native entrepreneurs than its size warrants, but there are more who established the company here (first blend) and even more who have later moved the company's address to Copenhagen. The other large area in Denmark, central Jutland with Aarhus as the capital, experienced attraction by being the first city outside the capital with a university, where others here have also applied. The same is seen with Funen, where Southern Jutland also has strong regional cohesion, despite Southern Jutland being strongly professional and process-related less than technology-driven. North Jutland has not yet experienced this effect, which is primarily because the large telecom companies created in relation to the university in this area have either been acquired or have gone bankrupt.

Universities hereby educational background (see Fig. 1) had a major impact of where new companies were established. For example—the hearing aid industry, where there is

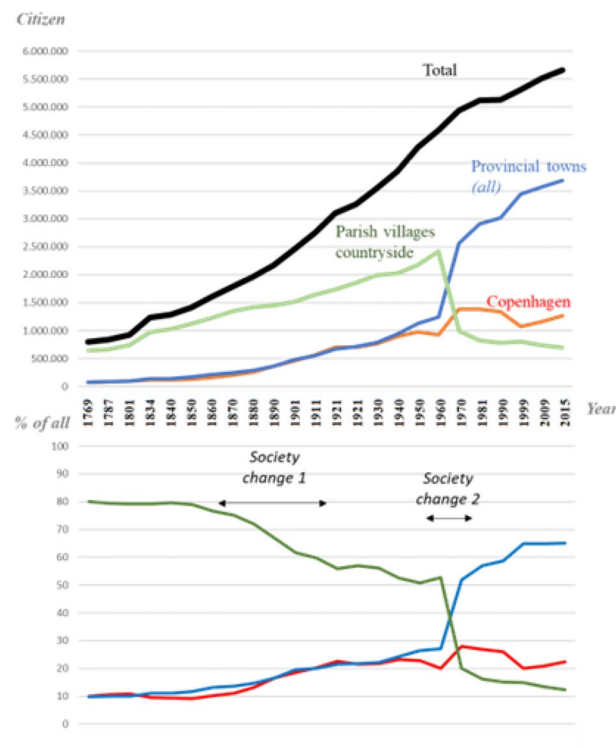


Fig. 9 The development of population with urbanization in Denmark and location of the most important social change (based on data from statistics Denmark)

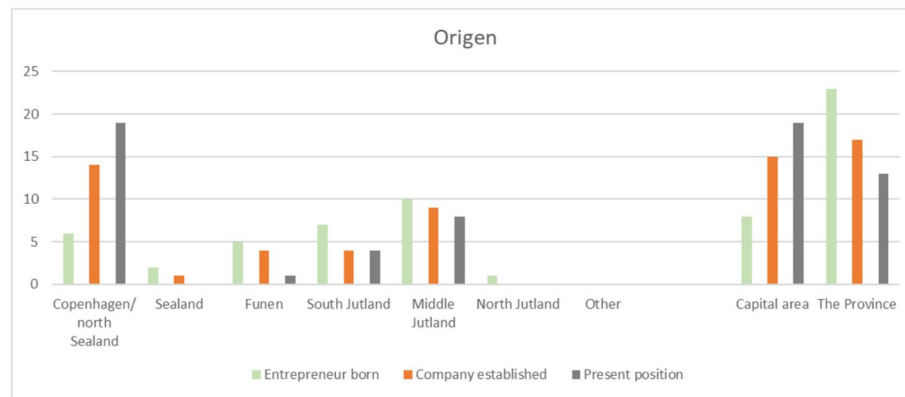


Fig. 10 The entrepreneur's birthplace, company start-up and company location today

a very strong cluster in Denmark around Copenhagen, started as a cluster in Odense in the centre of Funen. The medico cluster was created by several pioneers related to the University of Copenhagen and here an environment was created, but the Nobel Prize winning founder serving as a strong driving force grew up in Central Jutland. The food industry with cooperatives started as grassroots movements in Jutland, but here there was not the same need to attract highly specialized experts—and these companies are still rooted in Jutland. The wind turbine industry has a background in equipment for agriculture, all located in Jutland and mainly at country site, and their development took place at a time when both Aarhus and Aalborg University in Jutland were developed with technical science and engineering universities, and the main offices (cluster) are still in Central Jutland now located close to university cities.

From a retrospective perspective, it thus makes very good sense to work with technological and scientific research in the places where you want to create perspective-rich manufacturing companies, where the foundation (competencies) is built up. It's not enough to have competencies and opportunities—there must be a milieu (Marinova and Phillimore, 2003), a network for system integration and innovation in the national system (Marinova and Phillimore, 2003, Tidd, 2006; Kunze et al., 2011) and the ability to operate vertical.

This should be sought to be filled in a system for creating blending facilities for start-ups followed by vertical innovation, as we see 2nd-degree blend based on several areas in the vertical chain as a basis for the development of entrepreneurs based on a technology, knowledge and a competence platform.

Implications for guidance of prospective entrepreneurs?

The debate over whether opportunities or competencies are more crucial for starting a business resembles a “chicken-and-egg” dilemma, as both are essential. However, our research reveals that for large, enduring manufacturing companies, competencies have taken precedence—contrasting with the current guidance often given to aspiring entrepreneurs, which tends to emphasize opportunities.

This analysis processes two central aspects surrounding competencies and opportunities that—in the right situation and coupling (blending), can contribute to the emergence of new things, here defined as start-up (entrepreneurship), growth and survival.

Competences encompass a multifaceted array of attributes, including professionalism, knowledge, and skills. Skills can be learned through study but are also something developed through life and work experiences. There are different types of skills, and some may be easier to access for some people than others, based on things like dexterity, physical abilities, and intelligence, and most jobs require multiple skills, whereas some skills will be more useful for certain professions than others.

These skills manifest as the ability to apply knowledge effectively in execution or performance, as well as the dexterity or coordination required in executing learned physical tasks.

Competences can consist of many things such as professionalism and knowledge, skills such as the ability to use the knowledge readily in execution, or performance, but can also be in the dexterity or coordination in the execution of learned physical tasks. This can be seen as doing something learned competently or as a developed aptitude (Deist & Winterton, 2005). Competence is also viewed as the proficient execution of learned tasks e.g. obtain through university activities, exercises and work-related activities (Kolb, 2014) or as a developed aptitude (Eraut, 1998). The spectrum of skills is diverse, with varying levels of accessibility for individuals based on factors such as dexterity, physical abilities, and cognitive capacities.

The concept of “opportunity” is inherently ambiguous and encompasses various interpretations. In the context of entrepreneurship, opportunities are often perceived as market opportunities (Tidd et al., 2005).

However, opportunities extend far beyond this scope. They also encompass circumstances, occasions, and present situations that enable individuals to perceive, reflect upon, and act in ways that are personally meaningful. The challenge of working with opportunities lies in their ubiquity, but opportunities gain significance only when they are contextualized and resonate with the individual in a specific setting (Drucker and Senge, 2001). Competencies, on the other hand, can be viewed as a foundational platform—a starting point for action. These competencies must be blended with identified opportunities to create meaningful outcomes. While entrepreneurial literature frequently focuses on market opportunities, opportunities may also arise from personal interests (e.g., sports or leisure), circumstances (e.g., global goals or personal beliefs), or specific events (e.g., natural disasters, wars, or pandemics). However, it is not the opportunity itself that forms the foundation; rather, it serves as the catalyst for the process, activating skills and enabling their interplay with opportunities to form an effective blend.

Drawing from our comprehensive analysis of strategies employed by successful manufacturing companies for their establishment, expansion, and long-term viability, we propose a different balance when guiding knowledge-based or measurement-driven startups. This perspective complements and enriches the current entrepreneurial discourse.

Competencies, when not blended with opportunities, primarily lead to the development or deepening of existing competencies. Similarly, opportunities that remain unblended often appear merely as interesting but lack actionable significance (Fauconnier and Turner, 2002; Oakley and Pascual, 2017). However, when competencies are strategically blended, they can be utilized to create solutions within the realm of potential possibilities. This process is not characterized by a “push” dynamic (as seen in 1st and

2nd generation innovation models, e.g., Rothwell, 1992; Berkhout et al., 2007; Bochm and Frederick, 2010), but rather by a more complex process resembling the 5th generation innovation ‘and’ elements of open innovation (Chesbrough, 2003) mechanism driven by systematic approaches aligned with the 5th generation innovation framework (Kunze et al., 2011; Tidd, 2006) (Fig. 11).

Our findings, as previously illustrated in Fig. 7, indicate that the opportunities exploited in subsequent blends—following the initial blend—often emerged from within the vertical chain. This observation is consistent with the results of Brix and Peters (2015), who emphasized the importance of leveraging opportunities within this structured framework of vertical innovation (Jakobsen et al., 2012), where opportunities arise by blending competencies with opportunities that, due to the ability to conceive, gain potential (Jakobsen et al., 2024), and where subsequent blends for growth and survival appear as several elements in the vertical process (Jakobsen, 2012), where transformations and disruptions are also seen. By blending competencies and opportunities systematically, it becomes possible to stage solutions that are both practical and transformative, aligning with modern innovation models and methodologies.

The initial blending process, rooted in competencies, is inherently repeatable, regardless of whether the first blend resulted in failure, moderate success, or significant success. This repetition simply requires identifying a new area of opportunities. Our analysis suggests that most companies (all included in the study) are established through an initial blending process, but sustainable growth often stems from what we term “2nd-grade blending” (Fig. 12).

Second-grade blending appears to be both more precise and easier to execute. This is likely because companies benefit from greater knowledge gained through the experience of the first blend and from the competencies developed during that initial process, particularly in utilizing blending as an innovative capability. However, the critical challenge lies in recognizing the necessity of engaging in second-grade blending. Often, new and relevant opportunities exist between the areas of the initial and subsequent blends, but

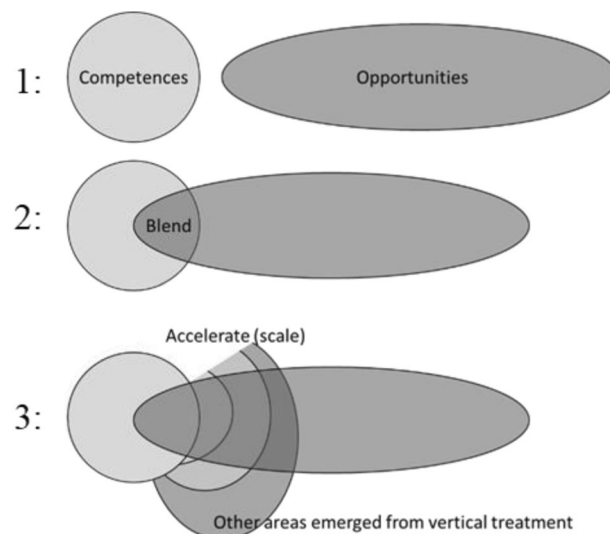


Fig. 11 Principle for start-up. When or if a blend arises (2) competence-based entrepreneurship happen, else it just competence and opportunities (1). Scale is possible from the blended area (3)

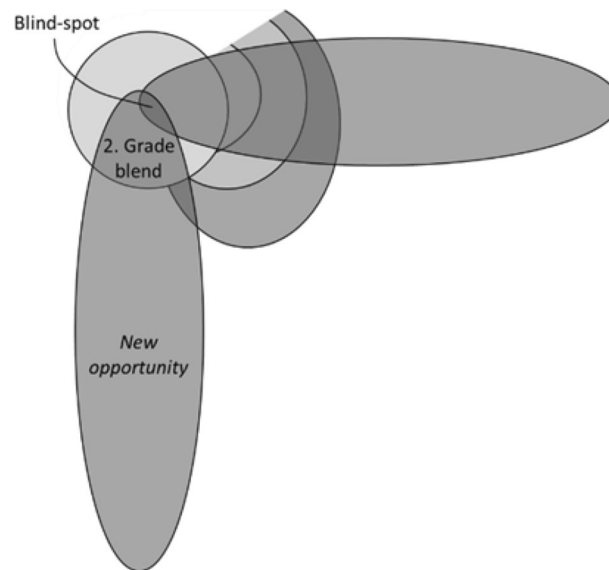


Fig. 12 Principle for growth. When a first blend is made it is possible to scale. But growth come from 2. Blend, which is easier to do as there is experience from first blend. Between the two blend, there may be an underscored possibility in the form of a blind spot

these may remain hidden in a “blind spot”—unrecognized or overlooked, even though they align with the company’s existing competencies.

Accelerating this second-grade blend process opens possibilities similar to those seen during the first blend. Between these two exploited possibilities, new opportunities often emerge—not merely as potential opportunities, but as *unfolded* and *immediate* opportunities. These new blends can be particularly obvious when viewed retrospectively but are typically less apparent in real-time due to cognitive or strategic blind spots (Scharmer, 2006, 2007; Baird and Case 2017). Recognizing and addressing these blind spots is crucial for identifying and leveraging the full spectrum of blending opportunities (Fig. 13).

The emergent approach has consciously and unconsciously made both the entrepreneur and the established company more flexible and adaptable in a dynamic market, where rigid planning and goal focus have been replaced by a focus on responding quickly to new opportunities and challenges—and exploiting these opportunities (Caizza et al., 2020). Here, the analysis shows that the starting and surviving companies have largely been able to take advantage of complex, non-linear processes instead of trying to control everything, where the competence-driven bottom-up approach has opened up for unexpected breakthroughs even in areas that are not immediately obvious (Busenitz et al., 2003). This is to be able to identify new opportunities and anticipate emergent trends matching the organization’s key and core competencies (Johannisson and Olaison, 2008).

Implications for entrepreneurs

Drawing from our analysis of successful Danish developing, manufacturing, marketing and selling startups and their growth, we propose the following concise yet bold guidelines for aspiring entrepreneurs:

1. *Prioritize competencies.* Focus on your existing competencies and allow them to unfold naturally, even beyond your core skills but comprehensive representation of capabilities developed through education, practice and experiences. Where

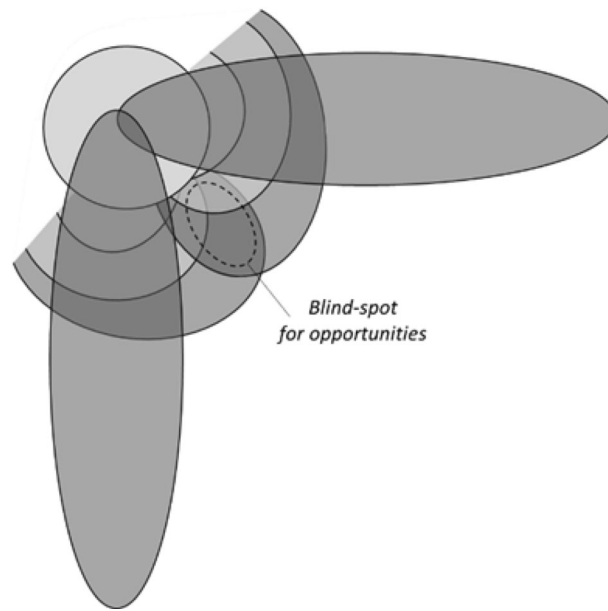


Fig. 13 Principle for survival. When both the first and second—and third and fourth etc. blend is made and immediate thereafter being scaled out widely, opportunities as blind spot not only in the blended area but also in the scaled area arises

competencies exist, networks often follow. This can also be described colloquially as “birds of a feather flock together”

2. *Opportunity focus in your domain of competencies.* Opportunities should be understandable rather than just be optimal, but to understand the full potential in a domain, competencies are required! It is therefore also rare that opportunities can be seen and exploited in areas where one does not have competencies, knowledge or experience. Traditional entrepreneurship emphasizes value propositions and structured business models in a narrow market segment. We challenge this by advocating for competence-driven approaches where interests align with capabilities, fostering meaningful blends. In the companies studied, the domain of the companies’ business areas was (and/or is) the domain of the entrepreneurs’ competencies. This can also be described popularly as “do what you love, and you’ll never work a day in your life”
3. *Assess trends and context.* Opportunities can emerge from societal trends, personal experiences, or global strategies like the UN goals, crises, cultural changes and social restructuring. However, it is difficult to determine whether such trends represent fleeting moments or genuine opportunities for startups (Hamel and Prahalad 1994). Opportunities often reside in areas aligned with competencies, particularly in high-tech fields where comprehension shapes opportunity recognition (O’Connor et al., 2020). This can also be argued following the human perception and understanding are shaped by the categories and concepts inherent to the mind, introduced by Immanuel Kant in *Weltanschauung* (worldview) in his *Critique of the Power of Judgment* (1790/2000). This can be described popularly as “one comprehends the world with the concepts by which one comprehends—and the more one comprehend the more can be explored! This is also framed as ‘Subjectivity is Truth’ defined by the Danish philosopher Søren Kierkegaard’s in his works, “Concluding Unscientific Postscript to the Philosophical Fragments” (1849).

4. *Adopt a “start and learn” mindset.* The startup phase often involves blending narrow competencies with specific opportunities. Whether the opportunity is sustainable or merely temporary becomes clear only with time. The focus should be on establishing a foundation and adapting through the exploration of new opportunities via a second blend (Brix, 2020; O'Connor et al., 2020). It is interesting to keep in mind that it is rarely the start as the first blend that creates something exciting (synes jo nettop vi slår på at det er spændende for entreprenuren ‘passion’—most often almost the opposite, but the start is crucial for the realization of the second blend including the blind spot, where the real foundation is based. This can also be described in popular terms as “*you have to learn to crawl before you can walk, but if you keep crawling you won’t get far!*”
5. *Embrace the second blend.* Expand the company’s competencies by exploring opportunities throughout the vertical chain as second blend is a combination of more domains in the vertical chain. This requires equal focus on all areas of business involving more aspect than just the core competencies and therefore not limited to a patent, a technology, a segment. This can also be described in popular terms as “*The whole is more than the sum of its parts*”. This originates from Aristotle’s Metaphysics statement, book VIII, but resonates also with approaches in systems thinking, Gestalt psychology, and scientific methodologies.
6. *Address ‘blind spots’* During the second blend, opportunities often arise that were previously unseen. These “blind spots” are invaluable sources of innovation and should receive special attention (Baird and Case, 2017). They often relate to tacit or latent needs that emerge through iterative exploration (Chilton and Bloodgood 2007). This can also be defined according to Otto Scharmer as, “*one cannot see the ‘arriving future’ by listening to the future, but the possibility arises (Presencing) by being in it with one’s skills and giving free rein.*”
7. *Build on successive blends.* Implementing the second blend paves the way for subsequent blends, establishing a foundation for strategic innovation and growth. Scaling opportunities and addressing overlooked areas require innovative skills and experience. These unrecognized opportunities often form the basis of competitive advantage and strategic development. This can be popularly described as: “*Don’t wait for the perfect moment. Take the opportunity in the moment and make it perfect.*”

Summary

Competence-based innovation, driven by blending opportunities, provides a solid foundation for startups. Historically, there is nothing to suggest that competencies are an obstacle to start-ups, quite the opposite, as competencies are a very good basis for the start-up. Growth arises from leveraging a second blend that explores emerging opportunities while identifying and embracing and pursuing the blind spots. This iterative approach aligns closely with strategic development and long-term innovation potential as emergent innovation.

Startups are thus rarely rooted in the full development of the potential of a competence, but rather in a narrow and comprehensive domain. For example, Novo Nordisk started with small production for the Scandinavian market based on other people’s patents and discoveries despite the founders having deep knowledge (Nobel Prize). Since then, Novo Nordisk has developed into one of the world’s largest biotech companies. Lego A/S started by making wooden toy figures, but the possibilities within

the new material plastic provided opportunities to scale based on an acquired patent and the use of plastic in the domain of the entrepreneur's knowledge of children's play and well-being. The innovation lesson with Thing Big (see the opportunity) but Start Small (exploit a narrow area where competencies can be blended and match opportunities) and Scale Fast (only possible through a second blend) also makes good sense for entrepreneurship!

A significant limitation in the analysis and a key area for future research is the lack of robust evidence demonstrating that deficiencies in the guideline directly contribute to start-up failures, instability, or business terminations. This gap in empirical support underscores the need for more comprehensive studies exploring the causal relationship between guideline inadequacies and negative business outcomes. Likewise, only surviving companies have been studied as "the good case". In the period studied, there have been significantly more bankrupt, closed or acquired companies, even large ones, which in the same way, through their mistakes and decisions, could provide a study-based picture of successful entrepreneurship.

Conclusion

This reflective investigation offers empirical insights that contribute to refining and advancing scholarly understanding of entrepreneurship and innovation, particularly in the context of competence, technology and/or knowledge-based startups and their growth trajectories. Although our analysis is limited to the 32 largest industrial companies in Denmark, measured by employee count and turnover, it provides some interesting analytical outcomes. From this investigation, the following conclusions have been drawn:

1. The starting point is for all analysed companies a deep competence gained through deep experience, education/research, and empirical work in the area of relevance for the start-up.
2. The entrepreneur's competencies have been used in connection with an opportunity that has arisen—an opportunity most often arisen in relation to societal or infrastructural changes or scientific breakthroughs. It is only where a blend between the specific competence and the specific part of the area of opportunity makes sense that entrepreneurship arises, also defined as opportunity recognition (O'Connor et al., 2020). Likewise, the same inequality can give several start-ups based on all the competencies that can be blended.
3. Growth is not created in the area that was the basis for the start-up (first blend). For growth, a new blend must be created, but this is based on the same competence area that created the foundation, thus taking its outset in the first blend with markedly stronger anchor in the vertical chain (Jakobsen et al., 2012; Brix, 2020) also defined as opportunity exploitation (Brix, 2020; O'Connor et al., 2020). Thus, it would not have been possible to create growth (2nd blend) without the learning from the start-up (1st blend) despite this is not where the growth can be seen.
4. Strategic innovation and growth are the ability to create new blends in the vertical chain for reinventing/renewing the business (Johnson et al., 2008; Jakobsen et al., 2012).

In addition, the analysis indicates:

- Competencies are crucial for both start-up and growth, whereas technology (including patents) can be purchased or licensed at least as a beginning and even, so it must be matching the competencies. A major part of the established companies in the analysis is based on insourced knowledge or acquired property rights.
- Start-ups are most often vertically narrowly focused (product, process, or sales) whereas growth requires a completely different, broader approach in the vertical chain (Jakobsen et al., 2012; Brix and Jakobsen, 2013; Jakobsen et al., 2013). This is also described as the activity to get from tacit to collective explicit knowledge (Baumard, 1999; Nonaka & Takeuchi, 1995).
- Opportunities in the system and the network (Kunze et al., 2011; Tidd, 2006) are crucial for both success and growth, including national systems (Marinova and Phillimore, 2003) and in particular universities in both research, development, and access to qualified partners and employees.
- Cooperatives is a form of company that not only relate to food but also to e.g., trading companies and insurance companies and has in its form been a distinctive Danish form of ownership, that has even garnered impressive success for almost 150 years. However, the method is not seen for new establishments. Similarly, fund ownership, where funds established by the entrepreneur are of crucial importance to half of the largest companies in Denmark. This is a distinct form in Scandinavia, and despite the fact that access to capital is often not as easy as seen by limited companies (share expansion), we have not been able to demonstrate in our analysis that this has a negative effect on the ability to innovate. Despite other traditions, the preferred thinking with the support of entrepreneurs in Denmark is raising capital (and establishing a basis for this) as well as support schemes (tied up in one's own ability to make a financial contribution). As a driving force for business growth, we have not been able to demonstrate that this matter, on the contrary, it has not been a significant factor!
- From the analysis it seems that it is significant easier to implement radical and transformative innovation in private companies, where the management consists of an owner, or a fund based on original entrepreneur. The decision-making process here for acceptance of radical and more risky activity is significantly different here than it is seen in listed companies, which is at least favourable in relation to a radical innovation agenda hereby emergent innovation as a main source for innovation and disruptions (Johannisson and Olaison, 2008; Oster, 2009).

Our framework diverges from the prevailing entrepreneurial guidance, particularly in its emphasis on competencies and blending as a fundamental basis. Conceptually, it aligns most closely with Sarasvathy's (2003) effectuation framework, though with distinct differences in focus and application.

Limitations

This analysis is provided based on an analysis of the 32 largest Danish industrial companies, listed by the Ministry of Business Affairs based on employees and turnover. Other sorting criteria could provide other listings, but the majority will still appear in most lists. The list also deals only with Danish companies with headquarters in Denmark, and the situation may be different in other countries. Of the 100 largest companies, only industrial manufacturing companies are selected, which is why production, technology,

marketing and sale also stands out strongly. If the analysis had referred to others as financial companies or trading companies, a different conclusion and recommendation might have emerged, which would be interesting to investigate in future research. Similarly, only existing companies are included in the analysis, where there are several now closed companies with exciting 1st and 2nd blends, some which even achieved extreme growth. This can be seen, e.g., looking at Danish suppliers to the Danish agro-industry, who at the industrialization of this industry experienced a glorious time with many oncoming companies. But time ended just as abruptly with the 2nd societal change with a dramatic change. Some reorganized (e.g., to virtually all wind turbine industries—but also many others), but a large part were unable to dazzle again with the new opportunities that have arisen and do not exist today. Finally, there are many merged companies that can appear with several different stories. Studying success obviously misses the learning that can be extracted from studying companies that failed.

Similarly, the analysis is limited to the largest enterprises. Here we know how they have fared, just as their history and motives are thoroughly described in biographies and the like. Whether our analysis and conclusion will also apply to small and medium-sized enterprises is not included in the present paper and will be of particular interest for more research since we have a strong suspicion that the same strong picture of emergence will emerge.

Indeed, prescribing the future based on the (far) past always has many potential limitations for many good reasons, especially biased selection of study object and changing conditions of start-up of today. Thus, it would be interesting to hold the outcomes of this research against data from more contemporary start-ups despite these not yet having demonstrated their ability to grow (second blend) or stabilize and survive (3rd and 4th blend), and therefore based on a momentary consideration may appear exciting despite their potential lack of continuous emergent innovation.

Appendix 1

The data basis for the analyses

List of the 100 biggest companies in Denmark, 2020: Årsrapport for virksomheden den 1. september 2020 (Erhvervsstyrelsen)							Start	Born
n	Name	Type	Area	Turnover	Employed	Established	Place	Place
1	Alm. Brand Forsikring A/S	Insurance						
2	Arkil A/S	Engineering Consultants	Infrastructure					
3	Arla Foods Ingredients Group P/S	Industry	Dairy	10,3	18765	1881 (S), 1882 (DK)	Vestjylland	Aarhus
4	Arriva Danmark A/S	Transport						
5	Atea A/S	Trade	IT					
6	BESTSELLER A/S	Industry	Textile	3,1	17000		1975	Aarhus Brande
7	Blue Water Shipping A/S	Transport	Shipping					
8	Brødrene A & O Johansen A/S	Trade	Building material					
9	Bygma A/S	Trade	Building					
10	Carlsberg	Industry	Beer	8,9	40000		1847	Vensyssel Copenhagen
11	Chr. Hansen A/S	Industry	Food engrediens	0,86	3000		1874	Ribe Copenhagen
12	Cirle K Danmark A/S	Trade	Oil					
13	Codan Forsikring	Insurance						
14	Coloplast A/S	Industry	Medico	2,5	12500		1957	Frederiksberg Humlebæk
15	Coop Danmark	Trade						
16	COWI A/S	Engineering Consultants	Construction					
17	Dagrofa ApS	Trade	Groceries					
18	Dagrofa Foodservice A/S	Trade						
19	DAMPKIBSELKABET NORDEN A/S	Transport	dry cargo and tankers					
20	Danfoss A/S	Industry	Industry Energy	5,2	40000		1933	Nordborg Nordborg
21	Danfoss Power Solutions ApS	Industry						
22	Danica Pension	Insurance	Pension					
23	DANISH CROWN A/S	Industry	Food company	3,1	6300		1887	Horsens Randers
24	Danske Bank A/S	Bank						
25	DPS A/S	Transport						
26	DLS a.m.b.a	Industry	Years	6,7	6600		1898	Aarhus Fredericia
27	DSB Vedligehold A/S	Transport						
28	DSV Road A/S	Transport	Goods					
29	DuPont Nutrition Biosciences ApS	Industry	Engrediens food	0,45	6880		1872	Fyn Copenhagen
30	Ejner Hessel A/S	Transport						
31	Eligant A/S	Trade						
32	Fakta A/S	Trade						
33	FALCK DANMARK A/S	Service						
34	FLSMIDTH A/S	Industry	Industry turnkey	2,4	13000		1882	Kerteminde Copenhagen
35	G4S Security Services A/S	Service						
36	GN Hearing A/S	Industry	Medical	2	6000		1869	Odense Copenhagen
37	Grundfos A/S	Industry	Industry water	3,5	19210		1944	Bjerringbro Bjerringbro
38	H. Lundbeck A/S	Industry	Medico	2,3	4980		1915	Copenhagen Copenhagen
39	Haldor Topsøe A/S	Industry	Chemistry	0,75	2300		1940	Skælskør Copenhagen
40	HOFOA A/S	Trade						
41	HØRKRAM Foodservice A/S	Trade						
42	IBM Danmark ApS	Service						
43	ISS Facility Services A/S	Industry	Facility management	10,6	534200		1901	Copenhagen Copenhagen
44	JEM & FIX A/S	Trade						
45	JYSK A/S	Trade						
46	KEMP & LAURITZEN A/S	Service						
47	KMD A/S	Service						
48	Københavns Lufthavne A/S	Transport						
49	LEGO System A/S	Industry	Toys	19,2	19000		1932	Filskov Billund
50	Lemvig-Müller A/S	Trade						
51	LEO Pharma A/S	Industry	Medicin	0	5700		1908	Copenhagen Ballerup
52	LINAK A/S	Industry	Mechanic	0,5	2200		1907	Guderup Als
53	Maersk A/S	Industry	Shipping and products	32	87700		1886	Mane Copenhagen
54	Marius Pedersen A/S	Industry	Waste handle	0,2	4700		1925	Fyn Fyn
55	Matas Operations A/S	Trade						
56	MT Højgaard A/S	Engineering Consultants						
57	NCC Danmark A/S	Engineering Consultants						
58	Netcompany A/S	Service						
59	Nets Denmark A/S	Service						
60	Niifisk A/S	Industry	Cleaning	1	5800		1906	Randers Copenhagen
61	NIRAS A/S	Engineering Consultants						
62	NNIT A/S	Service						
63	Novo Nordisk A/S	Industry	Medicin	18,8	45300		1923	Grenaa Bagsværd
64	Novozymes A/S	Industry	Enzymes	1,4	5825		1925	Bagsværd Bagsværd
65	NTS Nordic Transport Group A/S	Transport						
66	Nuuday A/S	Service						
67	Oticon A/S	Industry	Medtec	2,5	18100		1904	Odense Copenhagen
68	Per Aarsleff A/S	Engineering Consultants						
69	PFA Pension A/S	Insurance						
70	Post Danmark A/S	Service						
71	Q8 Danmark A/S	Trade						
72	Radiometer Medical ApS	Service						
73	Rambøll Danmark A/S	Engineering Consultants						
74	Reitan Distribution A/S	Service						
75	Ringkjøbing Landbobank	Bank						
76	Rockwool International	Industry	Isolation	0,4	11600		1909	Korsør Hedehusene
77	Royal Unibrew A/S	Industry	Beer	1	2800		1989	Aarhus Faxe
78	Saint-Gobain Distribution Denmark	Service						
79	Salling Group A/S	Trade						
80	Sanistål A/S	Trade						
81	Semler Retail A/S	Trade						
82	Shipco Transport Holding A/S	Transport						
83	Siemens Gamesa Renewable Energy A/S	Industry	Energy	3,5	6300		1980	Brande Brande
84	Solar A/S	Service						
85	Spar Nord Bank A/S	Bank						
86	Stark Danmark A/S	Trade						
87	Sydbank A/S	Bank						
88	The Drilling Company of 1972 A/S	Service	Olje, part of mærsk				2017	Copenhagen
89	Tivoli A/S	Service						
90	Topdanmark Forsikring A/S	Insurance						
91	Total E&P Danmark A/S	Trade						
92	Tryk Forsikring A/S	Insurance						
93	Tulip Food Company A/S	Industry	Meat	0,7	1550		1887	Randers Horsens
94	United Shipping & Trading Company A/S	Trade						
95	VELUX A/S	Industry	Construction	3	11500		1941	Mane Hørsholm
96	Vestas Manufacturing A/S	Industry	Energy	12,1	17250		1898	Lem Aarhus
97	Widex A/S	Industry	Medtec	0,25	3800		1956	Lynge Lynge
98	Wrist Group	Trade						
99	Zebra A/S	Transport						
100	Ørsted Bioenergy & Thermal Power A/S	Service						

Company	Emerges based on	Opportunity in the market	First Blend	Second Blend
Arla Foods Ingredients Group P/S	Formers with knowledge from primary production	Crisis in grain prices - farmers change to animal production	Dairy with butter	All dairy goods
BESTSELLER A/S	Bought a clothier shop, studied textile knowledge in Herning, had a shop with textile	His single had a woman clothes factory in Herning - couldn't sell. Started to sell his summer dresses for tourists in the shop	Own production of own design	Sale in own shops from own design and production
Bredrene Hartmann A/S	Based on their father's paper bag machinery factory in Lyngby	Egg production in Denmark was in strong growth in the 1930s	In 1936 they got a license on a new product for molded (her egg packaging)	Own machinery to be sold world wide
Carlsberg	As a brewer with own brewery, inherited from his father	German butter, more expensive beers had for several years been attractive	With his knowledge and adaptation of new technology adapted the trend from Germany	New packaging and system for transport for sale outside Copenhagen
Chr. Hansen A/S	Dr. Emil Christian Hansen received a gold medal for his dissertation on Danish fertilizer fungi from Copenhagen University	The fear of the sick beer was an eternal battle where yeasts and bacteria fought for power. By 1883, Carlsberg had dissolved beer, and large quantities had to be discarded. As a laboratory manager, ECH set out to investigate the	Brewer's yeast strains were isolated - and beer could be produced on a large scale	Natural solutions and ingredients within the food, nutritional, pharma and agricultural industries
Coloplast A/S	M.Sc. in engineering, Aage Louis-Hansen had a plastic factory making plastic bags	Nurse Elise Serensen invents the self-adhesive ostomy bag as her sister has been given an ostomy	Aage Louis-Hansen started a production of ostomy bags based on a license of Elise Serensen's invention	Ostomy, continence and urology as well as skin care and wound care
Danfoss A/S	Knowledge in cooling system eg. From working at Gram	Cooling systems made it profitable to produce American valves in Denmark	Cooling valves	Thermostats for heat control
DANISIL CROWN A/S	Formers with knowledge from primary production	Crisis in grain prices - farmers change to animal production	Slaughterhouses based on bacon production	Int. Slaughterhouse with finished goods production of sausages, soups, ready meals etc.
DJLG a.m.b.a.	Formers with knowledge in grain production	Clean grain from abroad and emancipated Danish soil	Joint purchase of fertilizer	Mergers and large-scale operations of buying, selling, mill
DuPont Nutrition Biosciences ApS	Danish farmers could provide cheap labor in Poland for labor-intensive beet production. Beet based sugar production was a substitute for sugar cane from the Caribbean, historically, grain-based spirits have been produced	Colonization of the colonies combined with new possibilities with sugar beets. Research breakthrough with the use of sugar beet based molasses for use in the manufacture of spirits	A business man set up a factory for sugar production based on sugar beet. Soups, spirits, etc. production could be established in Denmark after the decline of the colonies	Use of molasses from sugar beet for alcohol production. Fusion, monopoly
FLSMIDTH A/S	Engineering company for the construction of kilns for burning lime and clay for cement and the mills for crushing the cement into powder	They found out that bog soil from Jutland could be used to make cement. At the same time, new American rotary kilns showed exciting opportunities	The American kilns were purchased and cement production set up in Aalborg	The experiences from Aalborg's cement production created a basis for the development of turn key plants for cement production
GN Hearing A/S	The Great Nordic Telegraph Company (GN) had a concession agreement with the Russian Tsar - later with Lenin, with the exclusive right to establish and operate telegraph lines in Russia.	After II w w GN invested in companies with production within telephone, measuring equipment, hearing aids and several others. This led to an attractive GSM license from the Danish authorities.	Data communication and telephony	Hearing aids and headsets
Grundfos A/S	Press foundry and machine factory as well as services of a smithy and heating and sanitation	Received an order for a small automatic waterworks and couldn't find an electric pump of satisfactory quality	Made a pump for an order (piston pump) which was basic for a production	Circulator pump
H. Lundbeck A/S	A trading company of everything, later with sales, production and packaging of cologne, creams and medicines, where they had machine to beat tablets	Employed scientists and took home knowledge from Germany after II WW.	Development of own original products for specific diagnoses (wound healing)	Development of drugs for brain diseases
Haldor Topsoe A/S	Theoretical knowledge and experience of heterogeneous catalysis	After World War II, the demand for plastics increased rapidly	Catalysts and processes for the fertilizer industry (ammonia plants)	Catalysts and processes for the chemical and petrochemical industries (for the production of, inter alia,
HIS Facility Services A/S	A small guard company - arrange security for local companies	Guard activity is then workers not are there. This is also the best time for cleaning as it doesn't disturb production	Created the cleaning activity as a service for companies	Facility management etc. such as catering
LEGO System A/S	Had a Carpenter and joinery company (have bought it in 1916)	Crisis (depression) in farming and in the country in general, and the company almost went bankrupt. Due to lack of ordinary carpentry tasks, a production of wooden toys started.	Due to a lack of ordinary carpentry tasks, a production of wooden toys started - and became popular and was the basis for more than 15 years	Bought after World War II a plastic melt form in England (first in Denmark) and started to make "Automatic Building Blocks" (inspired by the British Kiddicraft blocks) made of cellulose acetate - the forerunner of the well-
LEO Pharma A/S	Two pharmacists, August Kongsted and Anton Anton, buy a pharmacy in Copenhagen that had been known as "Lægekøbsmand" since 1620. Using the very latest techniques in industrial processes, they establish a pharmaceutical production in the basement under their new pharmacy	Acetylsalicylic acid was launched in 1899 by the German pharmaceutical company Bayer under the name Aspirin. Bayer applied for a patent on the substance, but it was rejected, as acetylsalicylic acid had already been synthetically produced by Kolbe in 1859.	Manufacture and sale of an analgesic tablet AByl® (for centuries the best-selling in Denmark) - same as Aspirin, and a little later the heart preparation Digoxin LEO® (the first Danish medicine to be exported)	Based on experience with the production of penicillin during World War II, the production of Antibiotics and enzyme production became the basis for the factory's growth in the post-war period.
LINAK A/S	The name "Christian Jensen Machinery gear" with production of pulleys, grain grinders and axes for forgers primarily focus on agricultural production	Jens Jensen, the grandson, spoke one day to a friend from his student days who was disabled and in a wheelchair. Together, they came up with a new way to adjust his wheelchair	His grandson - engineer Bent Jensen coated the transformation, and the company started in 1976 to produce electric linear actuators and lifting columns with accessories	
Mærsk A/S	Captain bought the ship Lauer and used the Mærsk star. With his son they bought more ships	In the 1960s, an internal group of experts from the shipping company found that there was no financial basis for working with containers. Both too expensive and risky. This decision overturned Mærsk Mc-Kinney Møller	In 1974 he decided that the company should in future focus on building fast tonnage	Off shore industry, Danish Supermarket, medicine etc.
Marius Pedersen A/S	The wool spinner Marius Pedersen made a company offering Fünen municipalities to maintain the municipal roads using the road drum he had built himself	Marius Pedersen was strongly committed to thinking about recycling rather than throwing it away - even before his teenage modern	Waste treatment... collection, sorting, recycling and trade of waste as new resources.	Acquisitions of companies in the field of waste management
Niftek A/S	Engineer P. Fisker og H.M. Nielsen created a company mainly small electrical engine, originally as the basic component in ventilators, kitchen elevators, drilling machines and, later on, the Nielsens motorcycle	Fisker had a passion for use technology for new products mainly electric engine. Especially after World War II - then the women entered start to work in the factories, vacuum cleaners became popular	Fisker patents his first vacuum cleaner (1910), the first electric vacuum cleaner in Europe. The market was under particular pressure during the First World War and Niftek expanded its production with a motorcyle Nielsens	High pressure cleaners, industrial cleaning machines
Novo Nordisk A/S	Nobel laureate August Krogh from the University of Copenhagen was granted rights to manufacture insulin for the Nordic countries by Banting, Best and Macleod, Canada based on extracts of insulin from porcine pancreas	August Krogh Nobel prize in medicine 1920, his wife dr. Marie Krogh had diabetes 2 and a diabetes clinic	The Nordic Insulin Laboratory was founded in 1923 (later Nordisk Gentofte A / S) by August Krogh, Marie Krogh, Hans Christian Hagedorn and August Kjøpsted for the production of insulin, later human insulin. Medicine doctor Hans Christian Hagedorn together with his colleague August Krogh, zoologist and physiologist.	Novo Industri A / S (Novo Therapeutic Laboratory) and Nordisk Gentofte A / S (Nordic Insulin Laboratory) merge - two competing companies close to each other under the name Novo Nordisk A / S (1989)
Novozymes A/S	Novo had created alides for making enzymes alide beyond their main activity - medicine. Novozyme is independent but owned by Novo	Market for industrial enzymes	Enzymes for industrial use, microorganisms and biopharmaceutical ingredients	Enzymes for production of energy
Oticon A/S	The mechanic Hans Jørgen Frederik Demant has a sewing machine manufacture in Odense.	His wife Camilla had hearing problem, and have heard the crows Princess of England and hearing aid (daughter of king Chr. IX of Denmark), and want to do something for his wife	Hans Demant got the agency for The General Acoustic Co. for Denmark and founded the company Oticon as a trading company of hearing aids - later sales rights throughout Scandinavia next to its bicycle and sewing machine activity. Company moved to Copenhagen	Det første rigtige Oticon høreapparat introduceredes i 1947
Rockwool International	Master mason Henrik Johan Hørtenkov and brickyard owner Valdemar Kildahl opened a gravel pit on Omsø in the Great Belt with gravel pit, marl pit and lignite activities with the name "Singelsforretningen Omsø" to treat rubble for use in the expansion of the Kiel Canal	Finn Hørtenkov was given the right to drawings and know how for the production of rock wool in Scandinavia by the company Haldor-Hill, and production started in 1937 in Høddesunde based on the license agreement	Production of Stone wool solutions started in 1937 in Høddesunde based on the license agreement	Building insulation, acoustic ceilings, exterior cladding systems, solutions for plant cultivation, technical fibers for industrial use as well as insulation for process industry, marine and offshore.
Royal Unibrew A/S	Like most other breweries in Denmark, Carls was established as a white beer brewery (over-fermented beer with a low alcohol percentage)	The provincial towns in Denmark, Carls were growing rapidly as a result of strong urbanization	Production of bottom-fermented beer in large quantities (industrial production)	Mergers with breweries from across the country
Siemens Gamesa Renewable Energy A/S	Danmark was founded by the auto mechanic Peter Skibsløjer Sørensen, which produced field irrigation systems	Sharply rising oil prices in the 1970s and a general economic crisis (which continued until the early 1990s) resulted in the Folketing deciding to grant tax deductions to companies that promoted the development of renewable energy	Danmark Windpower was created, forerunner of Bonus Energy	Bonus Energy was taken over by Siemens Wind Energy
Tulip Food Company A/S	Established as a cooperative slaughterhouse by local farmers	With urbanization, the kitchen became smaller, the utility room disappeared and both husband and wife began working in the industry. The time to spend in the kitchen became less and the space for work more cramped, just as dishes after the introduction of the refrigerator could be stored even without salting	Bacon to England. First trademark in Denmark (1909)	Ready meals and pre-made dishes, ready for use in the kitchen primarily from animal production. Merger with other companies with the same market focus
VELUX A/S	Vilhelm Benedikt Kann Rasmussen had a degree in civil engineering from the Polytechnic, where he was also a researcher. After graduating, he became head of the Technical Department for skylights and glass roofs in the company Edvard Storr and had various jobs before starting his own engineering company in 1941 for consulting on glass roofs.	The strong urbanization or the strong development of the cities resulted in a shortage of space in virtually all cities. The houses got taller and all had high rise and had large unutilized ceiling space	Roof window to use empty roof area, able to open and close	Get sunlight and improve indoor quality, eg. skylights, light tunnels and skylight domes as well as accessories for the same.
Vestas Manufacturing A/S	Established as a blacksmithing company by Hans Søren Hansen, and expanded in the interwar period with the manufacture of steel frames for industrial buildings. After World War II changed the company name to Vestjysk Stålsmederfabrik (thereby Vestas) and had great progress in export markets also in the 60s and 70s due to the mechanization and development of agriculture	Sharply rising oil prices in the 1970s and a general economic crisis (which continued until the early 1990s) resulted in the Folketing deciding to grant tax deductions to companies that promoted the development of renewable energy. In 1980, a US state introduced a subsidy scheme of up to 50% of the price of a mill	In 1979 introduced the first wind turbine and from 1980 it went strong. The company did not create an organization for this and went bankrupt in 1986 - Vestas Wind System was re-established as a limited company without the original family (demand) the following year, and continued the wind turbine adventure, other activities stopped	Offshore wind turbines and mergers with other wind turbine companies such as Micon (even merged with Nordank Energy Group (NEG)), Wind World
Widex A/S	Engineer Christian Topholm and the business man Erik Westermann, both former employees of William Demant	Engineer Christian Topholm was factory manager at Oticon, businessman Erik Westermann was export manager at Oticon. Originates company of	Hearing aid	Fusion with Sivantos Group (Siemens). Sivantos Group was created by Rexton Hearing Aids in Odense, Denmark which was sold to German Siemens AG. Digital hearing aids.

Area	Name	Mia € Turnov	Total Employ	Established	Ent. Born Place	Now Place	History	Originator	Now
Dairy	Arla Foods Ingredients Group P/S	10,3	18.765	1881 (S), 1882 (DK)	Vestjylland	Aarhus	Grain was challenged and converted to animal production. Use of cow milk, first butter, then cheese etc.	Small farmers cooperative	Arla is Northern Europe's largest dairy group, Europe's 5th largest and World's 6th largest dairy group
Textile	BESTSELLER A/S	3,1	17.000	1975	Aarhus	Brande	Clothing shop in Ringkøbing, then exclusive female clothes	Established by Troels Holch Povlsen, shop trained	Marketing of own products and brands in own shops www
Packaging	Brødrene Hartmann A/S	0,35	1.500	1917	Lynghby	Lynghby	Based on their father's paper bag machinery factory in Lynghby, first machinery, from 1936 they get a license on a new product for molded fiber egg packaging		The factory is the largest and most modern factory in Europe for
Beer	Carlsberg	8,9	40.000	1847	Vestsyssel	Copenhagen	Lokal Hvedølssyng (over fermented)	Brewer J.C. Jacobsen	International brewing company, in the world no. 3
Food ingredients	Chr. Hansen A/S	0,86	3.000	1874	Ribe	Copenhagen	Yeast for beer production	CMH is a microbiologist and fermentation physiologist, doc. In separation of yeast for beer production	
Medico	Coloplast A/S	2,5	12.500	1957	Frederiksborg	Humblebæk	Nurse Else Sørensen invents the self-adhesive ostomy bag as her sister has been given an ostomy. The patent was sold as a license	M.Sc. in engineering, Aage Louis-Hansen started Coloplast together with his wife - a nurse. He had a plastic factory, but Coloplast was based on the licensed patent from Else Sørensen	Products within ostomy, continence and urology as well as skin care and wound care
Industry Energy	Danfoss A/S	5,2	40.000	1933	Nordborg	Nordborg	automatic valves for refrigeration systems	Based on customs restrictions and import bans cold Mads Clausen start a production in Denmark. Mads was mechanical engineer from Odense	Ventile, control system, both water and electric heating
Animal food	DANISH CROWN A/S	3,1	6.300	1887	Horsens	Randers		499 pig farmers joined in a cooperative to make a slaughterhouse	Int. Slaughterhouse with finished goods production of sausages, soups, ready meals etc.
Years	DLG a.m.b.a.	6,7	6.600	1898	Aarhus	Fredericia	Fusion of 5 feed association from the entire country	Farmers from Jutland	An international organisation business areas are farm supplies, vitamins and minerals, service and energy
Ingredients food	DuPont Nutrition Biosciences ApS	0,45	6.880	1872	Fyn	Copenhagen	De danske sukkerfabrikker	The business man C.F. Tietgen	Food ingredients and enzymes
Industry turnkey	FLSMIDTH A/S	2,4	13.000	1882	Kerteminde	Copenhagen		Engineer Frederik Læssøe Smith with trade in steam and milling machines.	International supplier of turn key equipment for cement industry
Medical	GN Hearing A/S	2	6.000	1869	Odense	Copenhagen	telegraph cables	The businessman C.F. Tietgen	hearing aids and headset
Industry water	Grundfos A/S	3,5	19.210	1944	Bjerringbro	Bjerringbro	Press foundry and machine factory	By engineer Poul Due Jensen as a press foundry and machine factory	World leading pump factory
Medico	H. Lundbeck A/S	2,3	4.980	1915	Copenhagen	Copenhagen	Trading company, Up until the 1970s, Lundbeck sold slippers	Trade educated Hans Lundbeck as Trading company including machines, biscuits, filled chocolates, sweeteners	Lundbeck focused on drugs for the treatment of diseases of the nervous system
Chemistry	Haldor Topsøe A/S	0,75	2.300	1940	Skælskør	Copenhagen	consulting engineer	Engineer Haldor Topsøe	Machines for heterogeneous catalysis, about 50 percent of the world's fertilizer is produced using technology from the company
Facility management	ISS Facility Services A/S	10,6	534.200	1901	Copenhagen	Copenhagen	Security company	the manufacturing wholesaler Marius Høgreffs bought the company small security company - København/Frederiksberg N Østvege	ISS offers a variety of services: cleaning, real estate services, catering, support services, security and facility management in more than 70 countries. Besides ISS have production for own use
Toys	LEGO System A/S	19,2	19.000	1932	Fiskov	Billund	carpenter and joinery company	Woodworker Ole Kirk Kristiansen. Due to the farming crisis he began in his carpenter and joinery company to make toys from wood	Global toys producer
Medicin	LEO Pharma A/S		5.700	1908	Copenhagen	Ballerslev	Established as a drugstore: "København Løveapotek"	pharmacist and engineer August Kornstedt (also initiator of Novo) and pharmacies Anton Antons (basic from Carlsberg)	develops, manufactures and markets drugs for the treatment of dermatological disorders as well as the prevention and treatment of blood clots.
Mechanic	LINAK A/S	0,5	2.200	1907	Guderg	Als	The name "Christian Jensen Maskinbygger" with production of pulleys, grain grinders and axes for forges primarily focus on agricultural production	Machine worker Christian Jensen. His grandson - engineer Bent Jensen created the transformation	Produce electric linear actuators and lifting columns with accessories.
Shipping and production	Maersk A/S	32	87.700	1886	Mane	Copenhagen	Captain bought the ship Laure and used the Maersk	Captain Peter Maersk Møller - later expanded with his father, at he transformed it with his son	
Waste handle	Marius Pedersen A/S	0,2	4.700	1925	Fyn	Fyn	offer to Funen municipalities to maintain the municipal roads using the road drum he had built himself		
Cleaning	NiRFuk A/S	1	5.800	1906	Randers	Copenhagen	Diske & amp; Nielsen	P. Fisker og H.M. Nielsen, making small electrical engine	
Medicin	Novo Nordisk A/S	18,8	45.300	1923	Gemas	Bagved	Insulin was extracted from porcine pancreas	Medicin doctor Hans Christian Hagedorn together with his colleague August Krogh, zoologist and physiologist. August Krogh nobel prize in medicin 1920), dr. Marie Krogh (who had diabetes 2 and a diabetes clinic)	develops and manufactures insulin, GLP-1 analogue, glucagon, hemorrhagic medicine, growth hormone and sex hormones.
Enzymes	Novozymes A/S	1,4	5.825	1925	Bagved	Bagved	Same history as Novo Nordisk	Same as Novo Nordisk	Enzymes for industrial use, microorganisms and biopharmaceutical ingredients
Medtec	Oricon A/S	2,5	18.100	1904	Odense	Copenhagen	Hans Demant got the agency for The General Acoustic Co hearing aids for Danes and founded the company Oricon as a trading company of hearing aids - later sales rights throughout Scandinavia next to its bicycle and sewing machine activity	The mechanic Hans Jørgen Frederik Demant who was a sewing machine manufacturer in Odense. His wife Camilla had hearing problem, and have heard the crown Princess of England had hearing aid (daughter of King Chr. IX of Denmark), and want to do something for his wife.	
Isolation	Rockwool International	0,4	11.600	1909	Korsør	Hedehusene	Opened a gravel pit on Omø in the Great Belt with gravel pit, marl pit and lignite activities with the name "Singelsforeningen Omø" to treat pebbles for use in the expansion of the Kiel Canal	Master mason Henrik Johan Henriksen and brickyard owner Valdemar Kähler	Stone wool solutions, including building insulation, acoustic ceilings, exterior cladding systems, solutions for plant cultivation, technical fibers for industrial use as well as insulation for process industry, marine and offshore.
Beer	Royal Unibrew A/S	1	2.800	1989	Aarhus	Faxe	History goes back to 1860s there Carlsberg, Thor, Ålborg was established	Several province breweries	Denmark's 2. largest brewery
Energy	Siemens Gamesa Renewable Energy A/S	3,5	6.300	1980	Brande	Brande	Established a Bonus energy	the auto mechanic Peter Stubkjær Sørensen	
Meat	Tulip Food Company A/S	0,7	1.550	1887	Randers	Horsens	Established as a cooperative slagterhuse	Local farmers	A Danish international food company that produces a number of meat products such as cold cuts, sausages, bacon, preserves, ready meals and soups.
Construction	VELUX A/S	3	11.500	1941	Mane	Hørsholm	First roof window to use empty roof area	Engineer Villum Kann Rasmussen	produces and sells skylights, light tunnels and skylight domes as well as accessories for the same.
Energy	Vestas Manufacturing A/S	12,1	17.250	1898	Lem	Aarhus	blacksmithing company that expanded in the interwar period with the manufacture of steel frames for industrial building	Hans Søren Hansen	
Medtec	Widex A/S	0,25	3.800	1956	Lynge	Lynge		Engineer Christian Tøpholm and the business man Erik Westermann, both former employees of William Demant	

	Start based on technology	Start Based knowhow	Start experien knowle	Start based on own compa	Blended changes in the societ	Blended Customs and dutie	Blended subsidies and grant	Blended technology (tech)	Blended situation in fami	Main grow by new product technol	Main grow by new production technol	Main grow by BM	Main grow by system inno	Main grow by Social & cultur	Main grow by new organization form	Main grow by fusion	Main grow by political
Company																	
Arla Foods Ingredients Group P/S			x		x						x			x	x		
BESTSELLER A/S				x	x						x			x			
Brødrene Hartmann A/S	x				x						x						
Carlsberg	x		x		x			x			x			x			x
Chr. Hansen A/S		x		x	x			x		x							
Coloplast A/S	x			x					x	x			x	x			x
Danfoss A/S		x	x			x				x	x			x			
DANISH CROWN A/S			x		x						x						x
DLG a.m.b.a.					x						x						x
DuPont Nutrition Biosciences ApS		x	x		x					x	x				x	x	x
FILSMIDTH A/S		x		x				x		x				x			
GN Hearing A/S		x		x				x		x				x			
Grundfos A/S		x		x	x						x			x			
H. Lundbeck A/S	x			x				x		x				x			x
Haldor Topsøe A/S		x		x	x			x		x		x					
ISS Facility Services A/S			x	x	x									x		x	
LEGO System A/S				x	x						x			x	x		
LEO Pharma A/S		x		x				x		x							x
LINAK A/S		x		x				x		x							
Maersk A/S			x	x	x						x	x			x		x
Marius Pedersen A/S				x										x			x
Nillisk A/S		x		x	x			x		x				x			x
Novo Nordisk A/S	x	x						x		x				x		x	x
Novozymes A/S		x						x		x					x		
Oticon A/S	x	x		x					x	x				x	x		
Rockwool International			x		x			x			x						
Royal Unibrew A/S			x		x			x			x				x		x
Siemens Gamesa Renewable				x	x		x				x			x	x		x
Tulip Food Company A/S			x		x						x						x
VELUX A/S		x			x					x		x		x	x		
Vestas Manufacturing A/S				x	x		x							x		x	x
Widex A/S		x						x		x						x	x

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Author contributions

The main author is responsible for data collection/generation and data analy-sis and the first draft, including the main conceptual work. The co-author is responsible for the critical review of all content, contribution to the theoret-ical background, and for collaboration on further improvement and devel-opment of the conceptual frames and results, and implications sections. The authors of this article bring extensive practical and theoretical experi-ence in entrepreneurship, start-up, and innovation activities, respectively, from many years of practicing consultancy and starting companies, and from academic-based entrepreneurship theory and practice, both particularly in tech- and research-based, and production-intensive sectors.

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Data availability

The core data generated and used in the article are provided in the appendix. References to all other data used in the article can be found in the list of references.

Declarations

Competing interests

The authors have no conflicts of interest that have or could have influenced the results in this article.

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