

Stage-Specific Drivers of Startup Ambidexterity

Paweł Mielcarek

Associate Professor, pawel.mielcarek@ue.poznan.pl

Klaudiusz Kalisty

PhD Student, klaudiusz.kalisty@ue.poznan.pl

Department of Organisation and Management Theory, Poznań University of Economics and Business, al. Niepodległości 10, 61-875, Poznań, Poland

Abstract

The paper considers the impact of ambidexterity, consisting of the relationship between exploration and exploitation, on the development of start-ups. The main goal of the study is to determine the importance of ambidexterity's critical success factors (CSF) for different phases of start-up development. Research covers 27 different CSF and 18 items describing ambidexterity. This set of variables were analysed in terms of seed, early and growth stage of start-up development. The statistical verification of research exploratory factor analysis (EFA) was applied with maximum likelihood as a factoring method. Study covers 170 start-ups operating in Poland. Respondents of the survey were general managers and business owners. The most important CSF for start-up ambidexterity are strategic cooperation, establishing formal cooperation and dynamic capacity. In terms of ambidexterity crucial activities relate to

offering new, unique values for customer and systematically checking customer satisfaction. At the same time CSF as leader's age and gender or academic training were not significant for start-up ambidexterity. Moreover, research shown that there is crucial difference between seed stage and other phases of start-up development, that require to pay attention to specific areas by the managers.

Most of the limitations is a result of applied method of EFA and size of the research sample. Due to achieved sample size it wasn't possible to form a factor for Expansion stage and Exit stage, therefore these stages weren't separately analysed in the empirical research. This paper fills the research gap regarding the use of ambidexterity in start-ups and also deepens the knowledge on how to shape individual stages of start-up development, which allowed for recommendations for practitioners and policymakers.

Keywords: start-up; start-up development; ambidexterity; exploration; exploitation; critical success factors

Citation: Mielcarek P., Kalisty K. (2026) Stage-Specific Drivers of Startup Ambidexterity. *Foresight and STI Governance*, 20(1), 31416. <https://doi.org/10.17323/fstig.2026.31416>

Introduction

Start-ups, defined as innovative, technology-driven ventures with high growth potential (Cockayne, 2019), face unique challenges across development stages, from resource constraints in seed phases to scaling pressures in growth phases. In field of management studies, start-ups are perceived via different scopes of theoretical foundations and frameworks, such as: entrepreneurship, innovation, creativity, business models and development strategies, resource-based approach, dynamic capabilities, social and cultural issues, ecosystems, network embeddedness, and more.

Prior research identifies several critical factors as predictors of start-up success. Among these are entrepreneurial leadership and experience, CEO vision and business idea, team members' background diversity, and dynamic capabilities (opportunity recognition), funding, commercialization, marketing and partner relationships (Argaw, Liu, 2024; Díaz-Santamaría, Bulchand-Gidumal, 2021; Kim et al., 2018; Sevilla-Bernardo et al., 2022). However it is evident that dynamic environmental conditions and higher levels of absorptive capacity present opportunities for ambidextrous start-ups to enhance their performance, if start-up manage to balance explorative and exploitative innovations (Khursheed, Mustafa, 2021). Yet, there is too little attention for use of ambidexterity and its impact on start-up development (Koprysa, 2021), especially focusing on how ambidexterity's critical success factors (CSF) vary stage-specifically. This gap is significant, as the allocation of resources between exploration and exploitation evolves throughout a start-up's lifecycle (Santisteban et al., 2021). While ambidexterity is recognized as critical for organizational adaptability and long-term success in established firms (March, 1991; Tushman, O'Reilly, 1996), its application in start-ups remains underexplored.

The main goal of this paper is to fill the mentioned gap by determining the importance of ambidexterity's CSF across distinct phases of start-up development. The study addresses these questions through quantitative analysing of survey data from 170 Polish start-ups, performed in the 1st half of 2024. The conceptual basis of the study, beyond CSFs, was formed by the theories of startups, paradoxes and ambidexterity. Based on its results, recommendations are formulated for corporate governance and the public sector on specific policy measures that contribute to the realization of ambidexterity potential, depending on the stage of development of the startup.

Literature Review

Theory of start-ups

Startup activities are under particular interest to researchers due to the high level of uncertainty surrounding business creation. The term "startup" first appeared in the 1970s¹. While there is no single theory of startups (their trajectories and development prospects depend primarily on the char-

acteristics of the founders and the context of the decisions made), several concepts have gained popularity, most notably "lean startup" (Ries, 2011; Blank, 2013; and others). These concepts have proven effective because they provide entrepreneurs with tools to test the potential of their startup ideas to solve real market problems. Startup entities have potential for rapid growth and scalability, and their business model must be design to support repeatable growth and provide profit (Santisteban, Mauricio, 2017). Start-ups are organisations with limited resources so the complexities and uncertainties related with running a business are especially relevant to them. Additionally, a start-up is defined as a fluid organisation since it is created for a specific purpose: to find a scalable and profitable business model rather than continuing in their current form (Hatzijordanou et al., 2019; Santisteban, Mauricio, 2017). The problem is that that many start-ups start with a product idea and then engaged time, effort, and resources on its development without checking whether they meet customer needs and can generate revenues in future. The Lean start-up concept is defined to solve this problem by attempting to cut own waste by preventive recognizing all activities and processes which customer does not need (Blank, 2013).

Researchers widely address key factors (CSFs) that enable business success. The concept of critical success factors (CSFs) was initially proposed by D. Ronald Daniel at McKinsey in early 1960s (Daniel, 1961), and later refined by John F. Rockart at MIT Sloan in the early 1980s. It is a method to identify the key information needs of managers in order to achieve strategic goals, by selection from broad industry factors to more specific company/job oriented requirement (Rockart, 1979). This concept should support managers with limited resources to identify the few crucial areas that determine an organisation to thrive, setting them apart from general 'success factors'. There are a range of important growth factors relevant to startups that can be merged into following groups: founder/leader characteristics, team member characteristics, business model/idea, financing, commercialization, institutional support and cooperation (Argaw, Liu, 2024; Díaz-Santamaría, Bulchand-Gidumal, 2021; Kim et al., 2018; Sevilla-Bernardo et al., 2022; Skawińska, Zalewski, 2022). However, it is challenging to compare and evaluate all of these variables because of fragmentation and lack of methodological, subject-related and subjective coherence in the presented studies. Moreover, with few exceptions (Khursheed, Mustafa, 2021; Koprysa, 2021), most of the studies do not relate to startups' ambidexterity. Therefore, in our study we reveal the critical success factors for shaping ambidexterity in start-ups.

Theory of Paradoxes

Paradoxes are defined as perceived contradictions inherent in people and organizations. They describe a persistent tension between certain phenomena, which are nevertheless interdependent. Four dimensions along which

¹ <https://www.thecrimson.com/article/2011/11/17/startup-language-idea/>, дата обращения 24.01.2026.

organizational paradoxes manifest themselves are identified: learning, belonging, performance, and management (Härtel, Krzeminska, 2024). Because paradoxes are potential sources of tension and conflict, they can serve a dual role: they can serve as opportunities for proactive management, fostering innovation and strengthening competitive advantage, or they can reinforce defensive responses that lead to organizational dysfunction.

The uncertainty, unpredictability and complexity of the environment create circumstances in which tensions and contradictions arise. These conflicts sometimes take the form of paradox, which is a difficult-to-assess and difficult-to-resolve relationship between two logically contradictory elements that are in fact simultaneously interdependent and determine the success of a company, understood as coping with reality (Achtenhagen, Melin, 2003). The influential works of Poole and Van de Ven (1989) and Quinn and Cameron (1988) offered early insights that underline the need to study and refine theory of paradox. Their research explored competing demands within an organizational system that can coexist and interact simultaneously. Further study by Lewis (2000) and Smith and Lewis (2011) focused on the concept of dynamic equilibrium, claiming that competing demands manifest in ongoing interactions that transform over time.

Paradoxes are in practice the occurrence of contradictions happening within events, actions assessment, and in consequence decisions taken. For instance, in the context of project-based organising, A. Wiewiora proposed three types of contradictions: project/organisational identity tension, short-/long-term-orientation and standardisation/flexibility tension (Wiewiora, 2023). While Y. Chen proposed following set of coupling tensions for organization: strategy: deliberate vs. emergent; structure: mechanistic vs. organic; incentive: pay for performance vs. tolerance for early failure; process: execution vs. search; customer involvement: mainstream customers vs. lead users; supply chain: efficient vs. responsive and acquisition: integration vs. autonomy (Chen, 2017).

Research propose various ways to cope with paradoxical tensions. One of options is to embrace the opposites and use them constructively (Poole, Van de Ven, 1989). Also learning to live with tension provides different perspective and approach to the problem, by giving a sense of freedom, reduces anxiety, and helps members avoid unnecessary disputes (Lewis, 2000). Therefore, effective managing of paradoxes support exploring, and not suppressing or eliminating, tensions. Also elimination is not recommended, while some tensions elicit positive reactions or it might not be possible to execute due to the character of contradictory phenomenon that are interconnected and mutual dependent. Smith and Lewis (2011) explain that ongoing and permanent tensions can activate positive or negative reactions, leading to creative or destructive cycles. Destructive cycles, which inflict negative effects, resulting from excessive dependence to either extreme of the paradoxical tension. However, effective managing of paradoxical tensions can

boost creative cycles that enable learning, survival, thriving, and action (Smith, Lewis, 2011). Dealing with paradoxes has an essential link to the nature of ambidexterity.

Ambidexterity theory

The concept of organizational ambidexterity was first formulated in (March, 1991). Until the early 1990s, the dominant belief in management literature was that the objectives of seeking new development opportunities (exploration) and realizing existing potential (exploitation) were incompatible with each other in terms of a company's resource allocation. This work was the first to raise questions about the irrelevance of this viewpoint and the development of organizational ambidexterity — the ability to combine the objectives of seeking and exploiting to improve business survivability and performance. The theory has gained a large and growing following, reflected in the growing number of publications on this topic each year (Kafetzopoulos et al., 2023).

Ambidexterity theory describes an organisation's or manager's ability to balance and excel at two seemingly conflicting activities: exploration (innovation, adaptation and new opportunities) and exploitation (efficiency and refinement of existing operations). This dual capability is considered essential for long-term success and adaptability in a changing environment (Kassotaki, 2022; March, 1991; Tushman, O'Reilly, 1996). An ambidexterity company should characterize with inherent flexibility, efficiency, and pursuing for consistent success over the long term. Opposite, the companies focused solely on exploiting of existing resources or seeking new opportunities to growth fall into a suboptimal equilibrium, jeopardizing their long-term survival. Risk of falling into this trap is fairly high, while exploration and exploitation are self-reinforcing processes that tend to cancel each other out.

There is no single accepted approach among academics on how to manage ambidexterity. However, a successful combination of exploration and exploitation should be result of cyclic reconfiguration of processes and the redistribution of resources set by the logic of dynamic sustainability. Companies must overcome internal and external boundaries to access untapped, risky dimensions for utilizing new resources. To achieve this, new complex management models are being developed, among which is "Distributed management" is a multidimensional structure connected vertically and horizontally by dynamic interfaces between departments (Harris et al., 2022).

Therefore, in order to successfully implement ambidexterity, it became necessary to analyse exploration and exploitation in terms of emerging tensions. These tensions describe the decision space and the main dilemmas of the problem. This conflict is characterised by pairs of competing values, including differentiation and integration, unit and organisation, static perspective and dynamic perspective, and external perspective and internal perspective (Mielcarek, 2021).

A taxonomy of the phenomenon was based on two dimension – time and innovation level, which allow to distinguish four ambidexterity forms: contextual (simultaneous implementation of exploration and exploitation by a given organization), sequential (long periods of exploitation are exchanged by short periods of exploration), structural separation (creation of separate units with distinguish strategies, cultures, structures, etc.) and peripatric ambidexterity (combination of exploration and exploitation occurring sequentially, however in spatial separation) (Mielcarek, 2021). Each form of organizational ambidexterity is characterized by advantages and disadvantages and can be useful in some context but they are also in some extent incomplete. Therefore Y. Chen proposed dynamic ambidexterity – which utilizes three forms of ambidexterity at different organizational level: at the corporate level company have to support structural ambidexterity, at the business-unit level it is important to focus on contextual ambidexterity, and at the project level sequential ambidexterity is crucial (Chen, 2017).

Phases of financing a start-up

The table 1 presents a typical breakdown of the funding phases of startups, together with the most common investors, instruments, and the purpose of a particular funding phase. This breakdown shapes the structural framework of our study.

The main objective of this work is to determine the contribution of critical success factors (CSF) to the formation of ambidexterity at various stages of startup development.

To achieve this, four research questions guide the study:

- How ambidexterity describes start-up development?
- What are the critical success factors for shaping ambidexterity in start-ups?
- Are development stages characterized by specific CSF for ambidexterity?
- How are exploration, exploitation, and ambidexterity realized at different stages of a start-up's development?

Research methods

This section is dedicated to describing research methods, including data gathering procedure and applied research tool, methods of calculation and characteristics of research sample.

Data gathering and research tool

The presented study covers 170 start-ups operating in Poland. The respondents of the questionnaire survey were general managers and business owners. The study was implemented throughout the 1st half of 2024 by a dedicated company. The time scope of the research is two years, from 2022 to 2024 (post-COVID-19). The design of empirical study, including the survey questionnaire, was developed based on a review of literature devoted to critical success factors for startups and managerial ambidexterity. The structural basis of the questionnaire was the list of 27 different start-ups critical success factors adopted from (Santisteban, Mauricio, 2017; Santisteban et al., 2021) as well as of 18 components of startup ambidexterity (Zakrzewska-Bielawska, 2018; Mielcarek, 2021).

To assess each variable, the corresponding questionnaire questions were used, the list of which is presented in Table 2. The classification of ambidexterity dimensions is additionally presented in Table 3. Ambidexterity is composed of two dimensions – exploration and exploitation, each containing nine variables (tab. 3).

Finally, ambidexterity is calculated as a mean of exploration and exploitation values. In both cases, CSF and ambidexterity were assessed on a five-point Likert scale. Statistical calculations were performed in JASP 2025 software, with applying threshold of the p-value less than 0.05 to ensure statistical significance.

Analytical Methods

The main of the applied calculation methods is exploratory factor analysis (EFA). EFA requires five statistical and methodological decisions, the best approach often unclear. These decisions include: data inspection techniques, factor analysis method, factor retention method, factor rotation method, and factor loading cutoff (Howard, 2016).

EFA is used to evaluate the structure of data by analysing the correlations between variables for relatively large set of variables. This method group data into dimensions by reducing a numerous variable into a smaller set of latent factors. Those factors cannot be measured or observed in direct way but allow for interesting analysis and drawing conclusions. Each original variable is model as a linear function of estimated factors.

The percentage of variance describes the portion of variance that is explained by created factors, and each subse-

Table 1. Funding phases of start-ups

Stage	Typical Investors & Instruments	Main Purpose/Use of Funds	Literature
Seed/Early	Government, grants, founders, family/friends, business angels, SAFEs, equity	Product development, initial team, market entry	Capizzi, Carluccio 2016; Lange et al., 2024; Parra, Winter, 2022
Growth/Expansion	State and corporate venture capital, bank loans, private equity	Scaling operations, hiring, market expansion	Fang et al., 2024; Singh, Hillemane, 2021
Late/Exit	Private investment funds, institutional investors, IPO	Large-scale growth, acquisition, exit strategies	Bauer et al., 2024; Singh, Hillemane, 2021

Source: authors based on the given literature

Table 2. CSF - operationalization of variable measurement in questionnaire

<i>Startup characteristics</i>	
	1. Age of the organization 2. Number of startup founders 3. Development phase
<i>Leader/owner characteristics</i>	
	4. Gender 5. Age 6. Motivation
<i>Resources</i>	
	7. Organizational culture supporting innovation and entrepreneurship 8. Dynamic capabilities 9. Technological/business capabilities 10. Staff has experience operating in the industry 11. Staff has managerial experience 12. Staff has prior experience running startups 13. Staff has an academic education 14. Staff has experience in research and development 15. Staff has intrapreneurial leadership capabilities 16. Location
<i>Environment</i>	
	17. Business incubator support 18. Venture capital financing 19. Developed ecosystem of innovation and entrepreneurship 20. Government support 21. Competitive market 22. Government policy on technology, science and innovation 23. Dynamics of the environment 24. Existence of a strategic cooperation network at the level of industry organizations 25. Existence of formal partnership agreements
<i>Results</i>	
	26. Achieving customer satisfaction 27. Product/service innovations
The Question: Please indicate the importance of individual factors in the development of your startup (answer 1 – significantly less important than other factors, 2 – less important, 3 – neutral importance, 4 – important importance, 5 – definitely very important compared to other factors).	
Source: authors.	

quent factor explains less portion of variance. The acceptable level of explained variance depends on research application. We calculated one factor for each stage of start-up financing and one factor for whole research sample. For factoring method maximum likelihood (MLF) was used, which as a drawback can produce inaccurate and inappropriate results in comparison to Principal Axis Factoring (PAF), but this is consider rare. MLF provides wider range of model fit shared with CFA/SEM, and gives more information than other EFA factoring methods, but also implies more demanding assumptions (Howard, 2016).

In terms of factor retention method, it is important to carefully chose number of factors that in accurate way explain correlation of data matrix, i.e. adding another factor would not improve model however reduce of the factor will result in worse model (Howard, 2016). Due to the need to perform three separate EFA procedures and the desire to maintain the transparency of the results, a limit of one factor was adopted. Moreover, there were a significant decrease in the explanatory power of the models for second and other factors.

We did not use rotation of data. Relevant threshold for factor loadings was set on 0.4. Firstly, we calculate results for whole research sample and then omit results with lower values (below 0.4) for separate development (financing) steps to clear the results.

Characteristic of the research sample

The characteristics of the research sample are shown in the table below (tab. 4). In general research sample can be described as start-up employing 1 to 3 employees, that is in the growth phase, use its own funds and do not apply any start-up development model.

Table 3. Ambidexterity - operationalization of variable measurement in questionnaire

<i>Exploration</i>	
Goals	1. The company was developed from the perspective of long-term profits 2. New market opportunities were exploited
Product	3. New products were produced 4. Expanded product range
Market	5. Created new entities, including spin-offs and joint ventures 6. Entered new markets 7. Offered new, unique utility values for customers
Competitive advantage	8. Developed company competencies 9. Created new competitive advantage
<i>Exploitation</i>	
Goals	10. Short-term profits were secured and generated 11. Continuous improvement was carried out and efficiency growth was achieved
Product	12. Improved existing products 13. Reduced production costs
Market	14. Sold intellectual property, patents and licenses 15. Increased economies of scale in existing markets 16. Systematically examined satisfaction of existing customers
Competitive advantage	17. Improved existing competencies 18. Protected, maintained existing competitive advantage
The Question: Please indicate the effects of your company's operations compared to your closest competitors. Please rate on a scale of 1-5, where 1 indicates a definite lack of effect and 5 indicates a definite effect.	
Source: authors based on (Zakrzewska-Bielawska, 2018; Mielcarek, 2021).	

Table 4. The characteristics of the research sample, n=170

Criteria	Response structure				
	Number of employees	1-3 employees 48.2%	4-10 employees 34.7%	11-30 employees 11.8%	More than 30 employees 5.3%
Industry	Agriculture 30.0%	Mining and excavation 1.76%	Industry 16.47%	Services 51.77%	
Sources of financing	Own funds 68.8%	Loans and credits 12.9%	Government and EU grants 12.6%	Business angels 3.5%	Venture capital 2.4%
Stage financing	Seed 24.1%	Early 30.0%	Growth 35.3%	Expansion 7.7%	Exit 2.9%
Model of start-up development	No model was used 43.5%	Customer Development Business 27.6%	Agile 13.5%	Lean start-up 11.8%	

Source: authors.

In the table 5 average values of ambidexterity, exploration and exploitation are presented for each start-up development stage. In all stages of development ambidexterity value is consistently increasing (to 3.791 in Expansion stage), to reach the lowest level in the final Exit phase (3.522). Also, first and last stage of development is characterized by a lower value of exploration in comparison to exploitation, which is rather consistent with the common idea of the allocation of activities and resources in the start-up development process.

Research results and discussions

When analysing the research results of EFA, it is worth paying attention to the factor created for the entire study population (tab. 6), which indicates the most important CSFs in relation to ambidexterity. Those critical success factors are Clustering concerned as strategic cooperation, Partners treated as taking up formal cooperation with other entities and Dynamic capacity (respectively factor loading of those CSF are 0.678, 0.654 and 0.650). This finding is supported by others research, i.e. Akmalia and Astuti (2022) stress that network capability affects startup performance. Moreover, Heuven and Groen (2012) noted that early stage start-ups take advantage of having a positioning network that contains many structural holes, as this makes it easier to identify cash acquisition opportunities and resource providers. Dias et al. (2024) claim that incubators directly influence innovation exploitation but not innovation exploration. They also support mentoring and coaching programs developing start-up innovation capabilities.

Table 5. Ambidexterity - exploration and exploitation of start-ups, n=170

Стадия развития стартапа	Constructs		
	Exploration	Exploitation	Ambidexterity
Seed (n=41)	3.523	3.569	3.546
Early (n=51)	3.595	3.508	3.551
Growth (n=60)	3.596	3.572	3.584
Expansion (n=13)	3.846	3.735	3.791
Exit (n=5)	3.511	3.533	3.522
All stages (n=170)	3.595	3.563	3.579

Source: authors.

Focusing on phenomenon of ambidexterity there are a few crucial remarks to be noted. The most important are activities related to offering new, unique values for customer and systematically checking customer satisfaction (respectively factor loading is 0.529 and 0.573), further is entering new market and increase economies of scale (respectively factor loading is 0.540 and 0.520) and finally creating new competitive advantage and securing existing advantage (respectively factor loading is 0.569 and 0.504). Customer-centric approach is crucial for maintaining competitiveness and start-up's long-term growth (Santisteban, Mauricio, 2017), that reflect exploration activities. However, in other perspective, exploitation enhance a company's control over its processes and develop customer-centric improvements (Alcaide-Muñoz, Gutierrez-Gutierrez, 2017; Koryak et al., 2018). Moreover, start-ups that excel in customer satisfaction demonstrate better agility and responsiveness to market changes, which are crucial for establishing dynamic capabilities (Skawińska, Zalewski, 2020). This feedback loop between exploitation and exploration in the context of maintaining constant focus on customer satisfaction and appropriate balancing of the resources involved, is one of the key challenges for the development of a start-up ambidexterity.

Another crucial observation is that Early stage and Growth stage of start-up development are fairly similar to each other in terms of distribution of variables factor loadings. Thus, it can be assumed that both of these phases have similar conditions and patterns of development. However, Seed stage has a significantly different distribution of variables factor loadings, what distinguishes it from the other phases but also from the entire studied population. For instance, the most crucial CSFs for Seed stage are Dynamic capacity (with factor loading 0.816 to 0.650 for research population), Product and/or service innovation (with 0.810 to 0.605), Technology/business capabilities (with 0.785 to 0.611) and Customer satisfaction (0.784 with 0.590). According to Capizzi and Carluccio (2016), in Seed stage entrepreneur focuses on innovative concept and the way to transformed it into a profitable business. Product is merely conceptual idea, and the utility of the product or service needs to be assessed with prototype.

In early stages of start-up generating innovations and anticipation of long-term rewards (exploration) is more important, than sales or profits obtained in a short-term per-

Table 6. Factors loadings for CSF and ambidexterity for start-up development phase

Variables	Start-up development stage			
	Seed stage (n=41)	Early stage (n=51)	Growth (n=60)	All stages (n=170)
<i>Critical success factors</i>				
1. Business age	—	0.469	0.473	0.463
2. Number of entrepreneurial leader's	—	0.436	0.442	0.435
3. Entrepreneurial leader's gender	—	—	—	0.205
4. Entrepreneurial leader's age	—	—	—	0.245
5. Motivation	0.559	0.402	0.397	0.404
6. Stage financing	0.663	0.630	0.633	0.631
7. Innovative and entrepreneurial culture	0.666	0.592	0.588	0.595
8. Dynamic capacity	0.816	0.647	0.644	0.650
9. Technology/business capabilities	0.785	0.609	0.604	0.611
10. Industry experience	0.609	0.593	0.592	0.593
11. Business management experience	0.611	0.584	0.585	0.584
12. Previous start-up experience	0.594	0.602	0.600	0.602
13. Academic training	0.436	—	—	0.352
14. R&D experience	0.520	0.546	0.550	0.547
15. Entrepreneurial leadership	0.688	0.610	0.611	0.611
16. Location	0.518	0.488	0.488	0.486
17. Support of a business incubator	0.556	0.602	0.606	0.597
18. Venture capital	0.517	0.504	0.508	0.501
19. Developed innovation and entrepreneurship ecosystem	0.614	0.578	0.579	0.579
20. Government support	0.453	0.608	0.609	0.606
21. Competing market	—	0.504	0.499	0.506
22. Science and technology policies	0.581	0.547	0.542	0.548
23. Environmental dynamism	0.534	0.588	0.583	0.589
24. Clustering (strategic cooperation)	0.690	0.680	0.681	0.678
25. Partners (formal cooperation)	0.661	0.654	0.653	0.654
26. Customer satisfaction	0.784	0.586	0.581	0.590
27. Product and/or service innovation	0.810	0.601	0.598	0.605
<i>Company's ambidexterity</i>				
1. The company was developed from the perspective of long-term profits	0.522	0.442	0.445	0.438
2. Short-term profits were secured and generated	0.467	0.500	0.498	0.500
3. New market opportunities were exploited	0.439	0.437	0.434	0.439
4. Continuous improvement was carried out and efficiency growth was achieved	—	0.433	0.432	0.434
5. New products were produced	—	0.488	0.488	0.486
6. Improved existing products	—	0.442	0.443	0.441
7. Expanded product range	—	—	—	0.311
8. Reduced production costs	0.420	—	—	0.390
9. Created new entities, including spin-offs and joint ventures	—	—	—	0.348
10. Sold intellectual property, patents and licenses	—	—	—	0.281
11. Entered new markets	0.573	0.542	0.542	0.540
12. Increased economies of scale in existing markets	—	0.521	0.521	0.520
13. Offered new, unique utility values for customers	0.617	0.528	0.525	0.529
14. Systematically examined satisfaction of existing customers	0.780	0.571	0.568	0.573
15. Developed company competencies	0.673	0.486	0.482	0.488
16. Improved existing competencies	0.714	0.497	0.494	0.499
17. Created new competitive advantage	0.760	0.569	0.570	0.569
18. Protected, maintained existing competitive advantage	0.467	0.506	0.505	0.504
% variance explanation	34.0%	26.5%	26.3%	26.8%

Source: authors.

spective (exploitation). Therefore, sensing technological option and conceptualizing play crucial role with focus on designing and developing of solutions (Janssen et al., 2018).

In following stages of start-up development managers should develop dynamic capabilities of understanding market signals, especially in terms of sensing customers' needs and scaling and stretching business, while it has positive influence on new technology-based firms' growth (Teixeira et al., 2021). Also, different structure of factor loading is observed for ambidexterity in Seed stage, with leading role of Systematically examined satisfaction of existing customers (0.780), Created new competitive advantage (0.760) and Improved existing competencies (0.714). What is worth mentioning is that variables concerning creating a new product, expanding the range of products, or commercialization of intellectual property were not significant. That well reflects the specificity of the Seed stage focusing on creating a general concept and market research, validating the business model and often considering activities before creating a Minimum Viable Product.

Conclusions

This paper address uncharted area of ambidexterity in start-ups and also shed light on how to shape start-up development. The main goal is to determine the importance of ambidexterity's critical success factors for different phases of start-up development. In result four research questions were formulated.

1) *How ambidexterity describes the start-ups development?* First of all, four out of 18 ambidexterity's items proof to be irrelevant for factor describing the whole studied population, that is:

- Expanded product range,
- Reduced production costs,
- Created new entities, including spin-offs and joint ventures and
- Sold intellectual property, patents and licenses.

Perhaps, some of these variables does not reflect well the specificity of start-ups (Created new entities, including spin-offs and joint ventures), while other relate only to late stage and successful start-ups, that might concern minorities of the researched companies.

However, high diversification of factor loadings values can be useful to identify the most critical issues that determine each of start-ups development stage and perhaps suggest adjustment of ambidexterity concept dedicated to the start-up and new ventures.

2) *What are the critical success factors in terms of shaping ambidexterity in start-ups?* The most crucial CSF fostering ambidexterity are Clustering concerned as undertaking strategic cooperation, Partners treated as taking up formal cooperation with other entities and Dynamic capacity. Obtained results are confirmed by the literature showing the role of clusters and strategic partnerships for the development of start-ups (Dias et al. 2024; Kuckertz et al., 2010), especially in terms of access to external resources like net-

working, mentorship and technological capabilities (Akmalia, Astuti, 2022; Santisteban, Mauricio, 2017).

3) *Are the development stages of a start-up characterized by specific critical success factors for ambidexterity development?* Seed stage has a significantly different set of ambidexterity CSFs which makes it stand out from the rest of analysed phases and the entire studied population. The pivotal role for Seed stage plays Dynamic capacity, Product and/or service innovation, Technology/business capabilities, which is confirmed in other studies (Capizzi, Carluccio, 2016; Janssen et al., 2018; Teixeira et al., 2021). While the rest of start-up development phases have similar results to each other and whole studied population, as stated above.

4) *How are exploration, exploitation and ambidexterity realized at the different stages of a startup's development?* Answering this question, studies have shown that in all stages of development ambidexterity value is consistently increasing up to the Expansion stage and then drops to the lowest value in the Exit phase. Also, the first and the last stage of start-up development is characterized by a higher value of exploitation over exploration, characterized by "U" shape dependence. These results stand against other literature findings suggesting that early phases focus more on exploration, while next phases of development are about exploitation activities (Janssen et al., 2018; Teixeira et al., 2021). Some explanation of this phenomenon may derive from specificity of Polish start-up ecosystem, where often early stages of development are driven by utilization of internal resources and equipment and to some extent own fundings for development (Koprysa, 2021). But this reasoning requires further in-depth research.

From the above findings, practical recommendations follow that are addressed to start-up owners and managers as well as decision-makers at various levels of innovation and entrepreneurship policymaking.

From a managerial perspective, in the Seed stage the main emphasis should be placed on development innovative product and/or service by utilising technology and business capabilities, adjusted by dynamic capabilities coupling with the systematically examination of customer satisfaction. So, in the general the main effort focuses on exploitation particular on establishing business model and in terms of exploration on refine value proposition. In Early and Growth stage start-up should utilize exploration activities according with dynamic capabilities to embedded start-up in microenvironment by establishing strategic cooperation and formal partnerships that will allow creation of new competitive advantage.

From policymaking perspective, it is important to properly match the tools and incentives that adequately support the development of a start-up depending on the phase they are currently in as well the whole life cycle of start-up. For example, at the beginning, it is recommended to help in technology transfer and access to technical and business expertise. In subsequent phases, there should be focus on institutionalized support such as incubators and venues amplifying various forms of networking. While in Exit

stage aid in forms of services and policy supporting commercialization, transformation and scaling up of business. This research has several limitations. Most of them concern applied method of EFA and size of the research sample. It is crucial to stress that it wasn't possible to form a factor for Expansion and Exit stage, because three were too little data to create sufficient matrix for EFA calculation (respectively $n=13$ and $n=6$). Due to the specificity of the EFA method and number of variables, 45 rows of data were minimal requirement. Moreover, EFA explains from 26.3% to

34% of possible variance depending on created factor (bottom row of tab. 3). Therefore, the conclusions formulated in the paper do not refer to the entire studied population but to its most specific part described by created factor.

Also, as a consequence, the further direction of research is to expand the research sample in terms of its size and geographical scope to include other countries. Another direction might be application of structural equations modelling for selected latent variables, especially for testing internal cohesion of ambidexterity variable.

References

- Achtenhagen L., Melin L. (2003) Managing the Homogeneity-Heterogeneity Duality. In: *Innovative Forms of Organizing, An International Perspective* (eds. A. Pettigrew, R. Whittington, L. Melin, C. Sánchez-Runde, F. van den Bosch, W. Ruijgrok, T. Numagami, L. Achtenhagen, L. Melin), London: Sage, pp. 301–327. <https://doi.org/10.4135/9781446219386.n13>
- Akmalia M., Astuti R.D. (2022) The Role of Capability and Ambidexterity in Enhancing the Startup Performance. Paper presented at the 6th International Conference on Family Business and Entrepreneurship (ICFBE 2022, June 2, online).
- Alcaide-Muñoz C., Gutierrez-Gutierrez L.J. (2017) Six Sigma and organisational ambidexterity: A systematic review and conceptual framework. *International Journal of Lean Six Sigma*, 8(4), 436–456. <https://doi.org/10.1108/IJLSS-08-2016-0040>
- Argaw Y.M., Liu Y. (2024) The Pathway to Startup Success: A Comprehensive Systematic Review of Critical Factors and the Future Research Agenda in Developed and Emerging Markets. *Systems*, 12(12), 541. <https://doi.org/10.3390/systems12120541>
- Bauer D., Junge S., Reif T. (2024) May the resources be with you: A systematic review and framework of startup funding options. *Management Review Quarterly*, 74(3), 1365–1396. <https://doi.org/10.1007/s11301-023-00336-6>
- Blank S. (2013) Why the lean startup changes everything. *Harvard Business Review*, 91(5), 63–72.
- Capizzi V., Carluccio E.M. (2016) Competitive Frontiers in Equity Crowdfunding: The Role of Venture Capitalists and Business Angels in the Early-Stage Financing Industry. In: *Crowdfunding for SMEs* (eds. R. Bottiglia, F. Pichler), London: Palgrave Macmillan, pp. 117–157.
- Chen Y. (2017) Dynamic Ambidexterity: How Innovators Manage Exploration and Exploitation. *Business Horizons*, 60(3), 385–394. <https://doi.org/10.1016/j.bushor.2017.01.001>
- Cockayne D. (2019) What is a startup firm? A methodological and epistemological investigation into research objects in economic geography. *Geoforum*, 107, 77–87. <https://doi.org/10.1016/j.geoforum.2019.10.009>
- Daniel R. (1961) Management Information Crisis. *Harvard Business Review*, September–October.
- Dias Á., Camal C., Sousa B., Pereira L. (2024) The Role of Incubators in Promoting Innovation Ambidexterity Among Start-ups in the Tourism and Hospitality Industry. *Tourism and Hospitality Management*, 30(4), 569–579. <https://doi.org/10.20867/thm.30.4.10>
- Díaz-Santamaría C., Bulchand-Gidumal J. (2021) Econometric Estimation of the Factors That Influence Startup Success. *Sustainability*, 13(4), 2242. <https://doi.org/10.3390/su13042242>
- Fang Y., Guan B., Yang G. (2024) From Banks or Venture Capitals? The Financing Choices of Chinese High-Tech Enterprises During the Start-Up Period. *SAGE Open*, 14(3), 21582440241266021. <https://doi.org/10.1177/21582440241266021>
- Harris A., Jones M., Ismail N. (2022) Distributed leadership: Taking a retrospective and contemporary view of the evidence base. *School Leadership & Management*, 42(5), 438–456. <https://doi.org/10.1080/13632434.2022.2109620>
- Hatzijordanou N., Bohn N., Terzidis O. (2019) A systematic literature review on competitor analysis: Status quo and start-up specifics. *Management Review Quarterly*, 69(4), 415–458. <https://doi.org/10.1007/s11301-019-00158-5>
- Härtel C.E.J., Krzeminska A. (2024) Paradox theory. In: *A Guide to Key Theories for Human Resource Management Research* (eds. K. Hutchings, S. Michailova, A. Wilkinson), Cheltenham: Edward Elgar, pp. 185–190. <https://doi.org/10.4337/9781035308767.ch22>
- Heuven J., Groen A. (2012) The role of social networks in financing technology-based ventures: An empirical exploration. *Venture Capital*, 14(2–3), 131–149. <https://doi.org/10.1080/13691066.2012.659473>
- Howard M. (2016) A Review of Exploratory Factor Analysis Decisions and Overview of Current Practices: What We Are Doing and How Can We Improve? *International Journal of Human-Computer Interaction*, 32, 51–62. <https://doi.org/10.1080/10447318.2015.1087664>
- Janssen M.J., Castaldi C., Alexiev A.S. (2018) In the vanguard of openness: Which dynamic capabilities are essential for innovative KIBS firms to develop? *Industry and Innovation*, 25(4), 432–457. <https://doi.org/10.1080/13662716.2017.1414758>
- Kafetzopoulos P., Psomas E., Kafetzopoulos D. (2023) An SLR of firm ambidexterity: Organizing a future research path forward. *Journal of Management Development*, 42(3), 183–200. <https://doi.org/10.1108/JMD-05-2022-0104>
- Kassotaki O. (2022) Review of Organizational Ambidexterity Research. *SAGE Open*, 12(1), 1–22. <https://doi.org/10.1177/21582440221082127>
- Khursheed A., Mustafa F. (2021) Role of innovation ambidexterity in technology startup performance: An empirical study. *Technology Analysis & Strategic Management*, 36, 29–44. <https://doi.org/10.1080/09537325.2021.2020235>
- Kim B., Kim H., Jeon Y. (2018) Critical Success Factors of a Design Startup Business. *Sustainability*, 10(9), 2981. <https://doi.org/10.3390/su10092981>
- Korpysa J. (2021) Process Ambidexterity in Startups Innovation. *Management Systems in Production Engineering*, 29(1), 27–32. <https://doi.org/10.2478/mspe-2021-0004>

- Koryak O., Lockett A., Hayton J., Nicolaou N., Mole K. (2018) Disentangling the antecedents of ambidexterity: Exploration and exploitation. *Research Policy*, 47(2), 413–427. <https://doi.org/10.1016/j.respol.2017.12.003>
- Kuckertz A., Kohtamäki M., Körber C. (2010) The Fast Eat the Slow — The Impact of Strategy and Innovation Timing on the Success of Technology-Oriented Ventures. *International Journal of Technology Management*, 52, 175–188. <https://doi.org/10.1504/IJTM.2010.035861>
- Lange J., Rezepa S., Zatrochová M. (2024) The Role of Business Angels in the Early-Stage Financing of Startups: A Systematic Literature Review. *Administrative Sciences*, 14(10), 247. <https://doi.org/10.3390/admsci14100247>
- Lewis M.W. (2000) Exploring Paradox: Toward a More Comprehensive Guide. *The Academy of Management Review*, 25(4), 760–776. <https://doi.org/10.2307/259204>
- March J.G. (1991) Exploration and Exploitation in Organizational Learning. *Organization Science*, 2(1), 71–87. <https://www.jstor.org/stable/2634940>
- Mielcarek P. (2021) *Strategic coherence and process maturity in the context of company ambidextrousness*, Warszawa: C.H. Beck.
- Parra Á., Winter R.A. (2022) Early-stage venture financing. *Journal of Corporate Finance*, 77, 102291. <https://doi.org/10.1016/j.jcorpfin.2022.102291>
- Poole M.S., van de Ven A.H. (1989) Using Paradox to Build Management and Organization Theories. *The Academy of Management Review*, 14(4), 562–578. <https://doi.org/10.2307/258559>
- Quinn R.E., Cameron K.S. (eds.) (1988) *Paradox and transformation: Toward a theory of change in organization and management*, New York: Harper & Row Publishers.
- Ries E. (2011) *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses*, New York: Crown Business.
- Rockart J.F. (1979) Chief Executives Define Their Own Data Needs. *Harvard Business Review*, 57(2), 81–93.
- Santisteban J., Inche J., Mauricio D. (2021) Critical success factors throughout the life cycle of information technology start-ups. *Entrepreneurship and Sustainability Issues*, 8(4), 446. [https://doi.org/10.9770/jesi.2021.8.4\(27\)](https://doi.org/10.9770/jesi.2021.8.4(27))
- Santisteban J., Mauricio D. (2017) Systematic literature review of critical success factors of information technology startups. *Academy of Entrepreneurship Journal*, 23(2), 1–23.
- Sevilla-Bernardo J., Sanchez-Robles B., Herrador-Alcaide T.C. (2022) Success Factors of Startups in Research Literature within the Entrepreneurial Ecosystem. *Administrative Sciences*, 12(3), 102. <https://doi.org/10.3390/admsci12030102>
- Singh S., Hillemane B.S.M. (2021) Sources of finance for tech startups over its lifecycle: What determines their approach of sources and its success? *International Journal of Emerging Markets*, 18(8), 1766–1787. <https://doi.org/10.1108/IJOEM-06-2020-0705>
- Skawińska E., Zalewski R.I. (2020) Success factors of startups in the EU — A comparative study. *Sustainability*, 12(19), 8200. <https://doi.org/10.3390/su12198200>
- Smith W.K., Lewis M.W. (2011) Toward a theory of paradox: A dynamic equilibrium model of organizing. *The Academy of Management Review*, 36(2), 381–403. <https://doi.org/10.5465/AMR.2011.59330958>
- Teixeira E.G., Moura G.L.D., Lopes L.F.D., Marconatto D.A.B., Fischmann A.A. (2021) The influence of dynamic capabilities on startup growth. *RAUSP Management Journal*, 56(1), 88–108. <https://doi.org/10.1108/RAUSP-08-2019-0176>
- Tushman M.L., O'Reilly C.A. (1996) Ambidextrous Organizations: Managing Evolutionary and Revolutionary Change. *California Management Review*, 38(4), 8–29. <https://doi.org/10.2307/41165852>
- Wiewiora A. (2023) Identifying and managing persisting tensions affecting strategic learning from projects. *Long Range Planning*, 56(1), 102267. <https://doi.org/10.1016/j.lrp.2022.102267>
- Zakrzewska-Bielawska A. (2018) *Enterprise Development Strategies. A New Look*, Warszawa: Polskie Wydawnictwo Ekonomiczne (in Polish).