

THESES OF THE DOCTORAL (PhD) DISSERTATION

MODEL-BASED ANALYSIS OF THE ORGANISATIONAL CHARACTERISTICS OF START-UPS FROM AN ORGANISATIONAL LIFE CYCLE PERSPECTIVE

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1. INTRODUCTION OF THE TOPICS AND OBJECTIVES, HYPOTHESES

Nowadays, Heraclitus' truth that "nothing is constant but change itself" seems to be increasingly accurate, as organisations face environmental impacts with unprecedented levels of volatility, uncertainty, complexity, and ambiguity (BENNETT-LEMOINE, 2014; MILLAR et al., 2018) This raises the question of what can be expected of entrepreneurs who want to enter the market as new players in this environment if existing stable businesses have to remain successful in a context of continuous crisis. How can they meet turbulent environmental and customer expectations and often unforeseen economic impacts while facing the changes that come with growth alone? At the same time, the number of businesses and individual entrepreneurs in our country has been growing steadily yearly. In particular, the share of those opting for simplified business tax has increased in recent years, driven by a favourable regulatory environment until August 2022. It is a general phenomenon that out of around 100,000 new businesses per year, three-quarters do not even survive the first two years, while only one-fifth of organisations reach the fifth year. This trend, however, is not only a phenomenon in Hungary but also in Europe (PRP). Identifying this phenomenon as a primary research problem, I will, in one part of my thesis, seek to answer the question of what the reasons for this might be, whether it is the inadequacy of the business environment, competitiveness problems or perhaps management skills, including a lack of strategic thinking, that seal the fate of start-ups.

The research questions based on the problem identified, the research objectives and the hypotheses formulated are illustrated in Figure 1. The main research question of my thesis is: Is there a management tool or self-assessment model that can be used as a kind of medical chart" for start-ups by showing their position in the organisation's life cycle? (MRQ)

Along with the research problem, I formulated the following eight research questions:

Q1. What is the role of micro-enterprises in our economy?

Q2. What are the main reasons for the high failure rate of domestic enterprises?

Q3. Are organisational life cycle models suitable for assessing the exact situation of a start-up?

Q4 Is there a management framework that can be used to identify the stage in the organisational life cycle of a business?

Q5. Can the EFQM 2020 model criteria be used to assess a start-up micro-enterprise?

Q6. How do the start-ups in this research assess their performance in the EFQM-based simplified assessment model?

Q7 Is there a correlation between the DARTS model criteria and the management roles of Adizes PAEI?

Q8. Can the DARTS model be used as a kind of "medical chart" to identify its position in the life cycle?

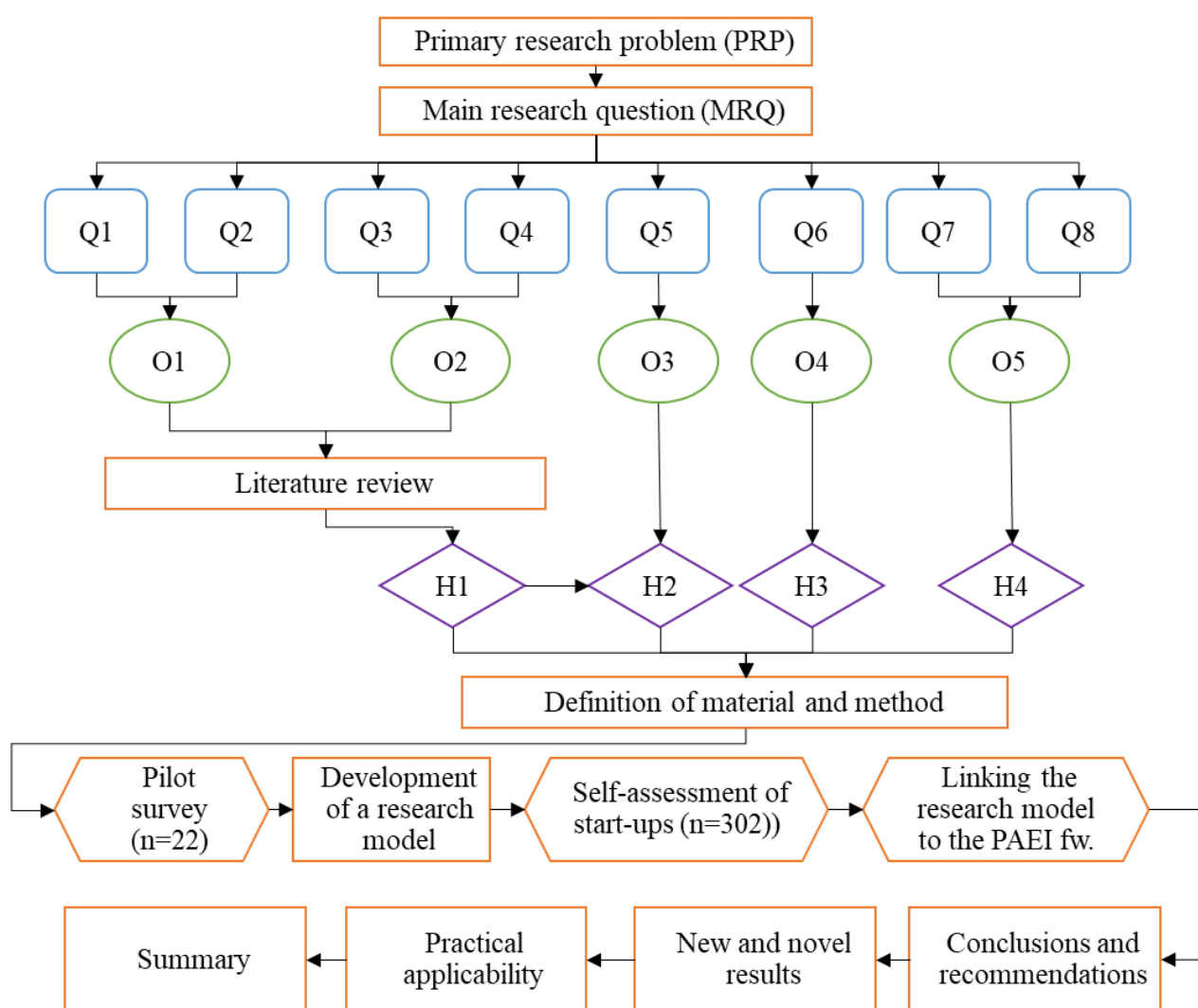


Figure 1: Research process

Note: Q1-Q8 = research questions, O1-O5 research objectives, H1-H4 hypotheses

Source: own study, 2023

Main objectives and hypotheses of the research

Based on the research questions, the objectives of the thesis are formulated as follows:

O1. To explore the situation and the role of start-up micro-enterprises in the economy and their operating environment

O2. To explore self-assessment models and organisational life cycle models adaptable to micro start-ups

O3. Validation of the EFQM 2020 model criteria and findings for start-ups

O4. Assessment of the organisational characteristics of start-ups receiving business support in the region

O5. Exploring the relationships between the DARTS model and the Adizes PAEI framework

Based on the research objectives formulated along the research problem and based on the literature, the following hypotheses were put forward:

H1: The position of a start-up cannot be precisely determined in organisational life cycle models, and therefore, an organisation cannot match the characteristics of each stage to itself, so it is not of real help to management. Thus, an organisation cannot match most life cycle models to itself; thus, they are no real help to management (TURZAI-HORÁNYI, 2020). The challenge lies in the fact that experts have different views on the boundaries of these stages. Therefore, no universally accepted model system would allow all companies to conclude under the same conditions (HORVÁTH, 2017).

H2: The EFQM model can be applied by organisations of any size, whether small, medium-sized or large (VUKOMANOVIC - RADUJKOVIC, 2013; FONSECA, 2015; ESCRIG - DE MENEZES, 2016; TURISOVA ET AL., 2020)

H3: Based on the logic and structure of the EFQM 2020 model, the simplified DARTS model developed in this research can be used to assess the organisational characteristics of a start-up enterprise. This is because the EFQM 2020 model is flexible, scalable and adaptable, making it easy to customise for different organisations and industries. These benefits can help organisations to become more competitive, achieve sustainable development and ensure long-term success (FONSECA, 2021).

H4: A correlation between the DARTS model criteria and the roles of Adizes management (PAEI) can be shown. The EFQM 2020 model, based on the DARTS model, emphasises a focus on the future, enabling organisations to remain agile and responsive in a rapidly changing business environment (FONSECA, 2021). Similarly, the PAEI framework plays an important role in providing a structured approach to managing organisational change and organisational development (SHETACH, 2010; MOWLANAPOUR et al., 2020)

2. MATERIAL AND METHODS

I conducted the research by collecting and analysing primary and secondary information and data. I based my research on secondary studies, the results of which I used to develop my primary research strategy. As a secondary data source, I used related scientific findings published in the national and international literature, which provided a comprehensive and detailed picture of the topic's general scientific state of the art.

2.1. Introduction to the study sample

In the course of my work, I came into contact with a consortium project, the "Money for the Future - Youth Entrepreneurship" programme, which provided applicants with the opportunity to receive a grant of HUF 4.5 million per person in the form of non-reimbursable funds to support their new start-up business. In the region, 2,105 people have been recruited, and 2,091 enterprises have been set up, of which 2,074 have started their operations with a non-reimbursable grant of HUF 4,573,800 from the Hungarian State Treasury (HBMVFA, 2023). The above 2,074 enterprises constitute the target group of my research, which have 1-2 years of operational experience at the time of the survey in 2022.

2.2. Design of the simplified survey model

Once the survey sample was compiled, the most obvious way to assess organisational performance would have been to have the 2074 enterprises in the target group complete the self-assessment according to the EFQM 2020 model. However, this would have had a meagre success rate even with the highest completion rate. In order to validate the model, a pilot team was formed from the target group by inviting the most popular core business operators. The purpose of the pilot survey was twofold: firstly, to test the validity and typicality of the model's propositions for a start-up micro-enterprise, and secondly, to see if a simplified model could be developed to measure and explore the components of organisational performance. According to BABBIE (2008), validation is a term used to describe a metric that accurately reflects the concept it is intended to measure. In this context, face validity is the property of an indicator that makes it appear to be a reasonable measure of some variable, i.e., whether it is applicable "at face value". The EFQM 2020 model criteria set out several findings for self-assessment of an enterprise; however, to make

it applicable to the target group of my research, I applied face validity in the form of a face-to-face questionnaire.

2.3. Methods of testing

The simplified survey model developed based on the above pilot was used to design an online questionnaire to conduct the quantitative survey. I structured the questionnaire to focus on the organisational self-evaluation to achieve its goal, so I divided it into 2+7 parts according to the design of the survey model; in the first part of the questionnaire, which consisted of 68 questions, basic information containing identifying information was given, followed by subsequent parts according to the criteria of the model.

In comparison, two technical questions were given at the end. The 60 self-assessment questions of the survey model allowed respondents to rate the performance of their enterprise on a scale of 1 to 10 (1: not at all true, 10: absolutely true) according to the findings related to each criterion or sub-criterion. The questionnaire was sent online to the target group, and the data was processed using Microsoft Excel and SPSS. The methods used to achieve the research objectives and to test the hypotheses are presented in Table 1.

The statistical correlation tests in my thesis include boxplot analysis (or boxplot analysis), regression analysis, correlation analysis, significance analysis, paired sample t-test and Friedman's test. Of these correlation analyses, multivariate linear regression and the various correlation analyses are the most voluminous in the results of my thesis, as the data are easy to review and summarise in an informative way. I have used correlation tests in my thesis to combine the two models, the simplified test model and the PAEI framework.

When developing a survey model and a questionnaire based on it, it is essential to ensure validity and maintain the stability of the measured values. If the conditions remain unchanged in repeated measurements, we should obtain the same values, i.e., the test should be reliable. The reliability of the test model was checked by calculating Cronbach's alpha.

Table 1: Research model

OBJECTIVE	HYPOTHESIS	METHOD
<p>O1. To explore the situation and the role of start-up micro-enterprises in the economy and their operating environment</p> <p>O2. To explore self-assessment models and organisational life cycle models adaptable to micro start-ups</p>	<p>H1: The position of a start-up cannot be precisely determined in organisational life cycle models, and therefore, an organisation cannot match the characteristics of each stage to itself, so it is not of real help to management.</p>	<p>Secondary research</p>
<p>O3: Validation of the EFQM 2020 model criteria and findings for start-ups</p>	<p>H2: The EFQM model can be applied by organisations of any size, whether small, medium-sized or large.</p>	<p>Primary research: personal questionnaire survey (n=22)</p>
<p>O4: Assessment of the organisational characteristics of start-ups receiving business support in the region</p>	<p>H3: Based on the logic and structure of the EFQM 2020 model, the simplified DARTS model developed in this research can be used to assess the organisational characteristics of a start-up enterprise.</p>	<p>Primary research: Development and application of an EFQM-based research model in a questionnaire survey Descriptive statistics, Box-plot analysis, Cronbach α, Paired sample t-test, Multivariate linear regression (n=302)</p>
<p>O5: Exploring the relationships between the DARTS model and the Adizes PAEI framework</p>	<p>H4: A correlation between the DARTS model criteria and the roles of Adizes management (PAEI) can be shown.</p>	<p>Primary research Friedman test for rank correlation parametric and non-parametric correlation analysis (n=302)</p>

Source: own editing, 2023

The results of the self-assessment were presented using a boxplot diagram according to the criteria of the test model. This plotting technique effectively visualises metric data as it visually summarises the main statistical characteristics.

3. MAIN FINDINGS OF THE DISSERTATION

The secondary analysis shows that, in agreement with the vast majority of economists, strengthening the competitiveness of small and medium-sized enterprises (SMEs) is of paramount importance for the competitiveness of regions, national economies and the European Union. Improving the competitiveness of SMEs can positively impact employment, job creation and prosperity and is a significant factor in economic performance. More than 99% of the enterprises operating in Hungary are small and medium-sized enterprises, while large enterprises account for less than 1% of all enterprises. Also, about 95% of the 897,167 enterprises operating in Hungary (SME Strategy, 2023) are micro-enterprises, of which almost 74% are micro-enterprises with one person.

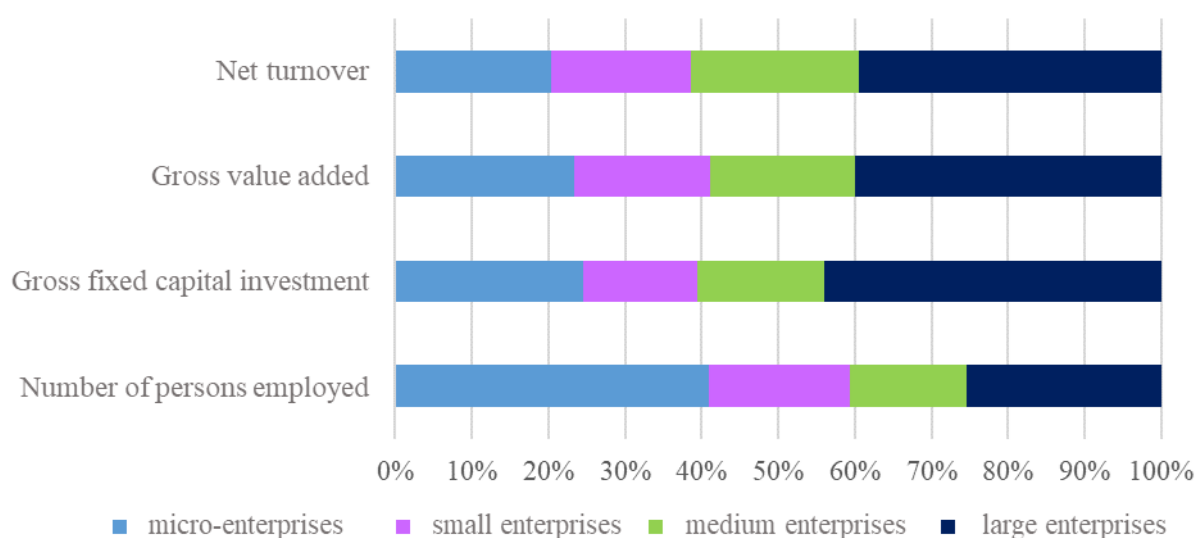
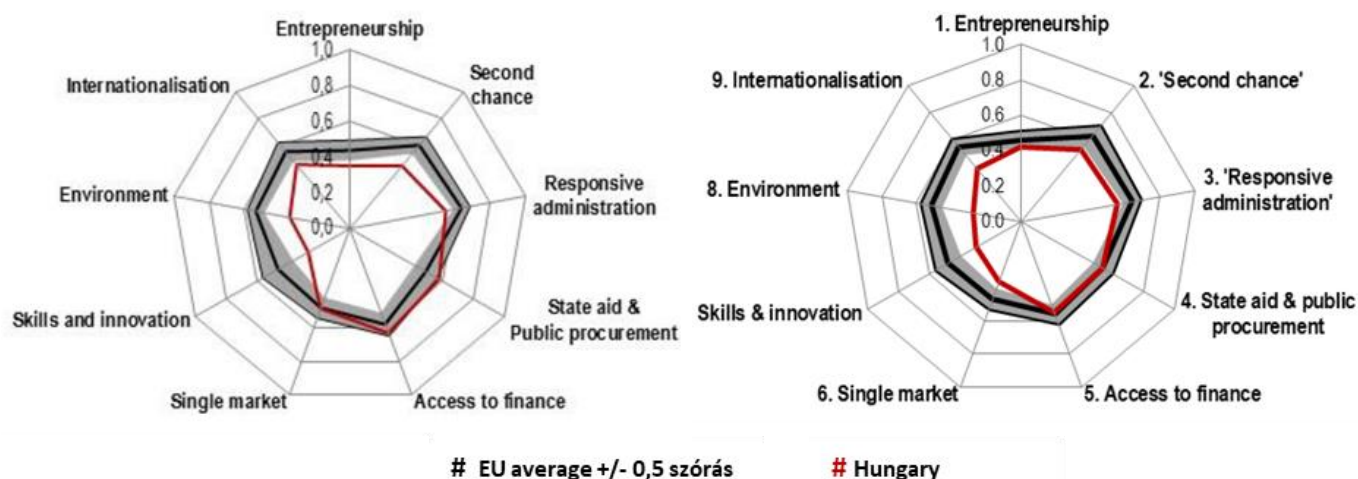


Figure 2: Breakdown of the leading indicators of enterprises by size class of enterprise

Source: KSH (2023)

Economic performance remains concentrated mainly in large companies, as in terms of added value, all enterprises contribute approximately HUF 38 thousand billion to the performance of the economy in our country, of which approximately 55% is produced by the SME sector. Within this, small enterprises accounted for 17.4% of this performance, while micro-enterprises accounted for 21.1% in 2022 (KSH, 2023), which is not negligible, amounting to slightly more than HUF 8 thousand billion. Small and medium-sized enterprises employed 2.35 million people in 2022, of which almost 60%, approximately 1.2

million employees, were employed by micro and small enterprises. At the same time, Hungarian small and medium-sized enterprises must also count on establishing and operating their enterprises with much more modest support and assistance measures. Examining the Hungarian SBA profile published in 2015 and 2019, it is clear that even in 2015, it fell even further behind the EU average (Figure 3).



3 Hungary's SBA profile in 2015 (left-hand diagram) and 2019 (right-hand diagram)

Source: *SBA Fact Sheet 2015. és 2019.*

The change is particularly striking: by 2019, only connectivity to finance and access to the single market reaches the EU average. In contrast, there is a growing gap in environmental protection, internationalisation and, most importantly, skills and innovation (SBA, 2019). Despite attempts to improve and simplify it, the operating environment remains unstable, as regulations often change unpredictably and in an ad hoc manner, and there is a lack of a transparent framework for stakeholder involvement, which significantly increases the adaptation costs of businesses and keeps them in a state of constant uncertainty. Small and medium-sized enterprises are vital for our country and the European Union, as although they do not generate the most outstanding value and do not make the most significant investments, their role in employment is unquestionable (Q1). Suppose we disregard the drastic decline resulting from the legislative change in 2022. In that case, it is still clear that the number of newly founded and existing businesses is decreasing. Based on the literature, it can be concluded that behind this is the unstable, volatile environment and the lack of competitiveness, which is also attributed to the loss of flexibility and leadership skills (Q2).

The actors of the SME sector, especially micro-enterprises, clearly need help, which, in addition to financial support, is increasingly essential for improving their competitiveness and, within this, developing their adaptability and “future-oriented” ability. The impossibility of this latter skill demonstrates the magnitude of the challenge that the EFQM2020 model formulates as an expectation of monitoring current and future market dynamics and data collection and analysis covering the business ecosystem (EFQM, 2020). The World Economic Forum identified the same as the ability to detect current and future business changes in its survey (WEF, 2016; GHOSH et al., 2021), and today's entrepreneurs should meet it.

SMEs have little impact on their operating environment; therefore, based on the research results, I recommend that business governing bodies and governments emphasise other support programs besides essential financing support. Developing the organisational capacity of domestic small and medium-sized enterprises is essential for producing high-value-added products or services, which can be supported with training and mentoring and competitiveness development programs. Of course, it is essential to qualify entrepreneurs and make them interested in participating in the programs to create as many competitive small and medium-sized enterprises as possible. In addition, it is a particularly important government task to improve the stability and predictability of the entrepreneurial environment, reduce the burden on entrepreneurs, and ensure access to financing and public procurement more effectively so enterprises can deal with less risk.

This can be helped by developing the recognition of predictable risk factors for small and medium-sized enterprises, which organisational life cycle models well interpret. However, there is no universal model system that would allow conclusions to be drawn for all enterprises under the same conditions since enterprises only sometimes follow the theoretical life path. Strengthening theoretical approaches with practical experience and research makes it possible to plan the short-term future vision of enterprises with the help of models. This makes it possible to predict crisis periods and their expected course so that immediate intervention is not necessary at critical points in the cycles. However, alternative strategies can be developed in advance. These results encourage researchers working on life cycle analysis to examine the criteria for which businesses can be assigned to each life stage and how life cycle analysis techniques can help company leaders determine management,

governance or future strategic goals (TURZAI-HORÁNYI, 2020). The compatibility between the models also speaks in favour of them since, after multilateral testing using different approaches, it becomes easier to choose the most appropriate continuation strategy, thanks to the comparison of different results (HORVÁTH, 2017.) Based on the literature, it can also be said that one of the most advanced and widely used organisational life cycle models is the Adizes model. The model shown in Figure 4 emphasises that company leaders must recognise the difference between traditional problems of the organisation's given life cycle phase and non-traditional and harmful problems that can lead to crisis or the complete collapse of the company. In his opinion, the fundamental role of management in the case of a family business, company, etc., can be defined by four functions. If a company can develop these so-called PAEI roles, it will be successful, which means short and long-term success and efficiency (HORÁNYI – TATÁR, 2016).

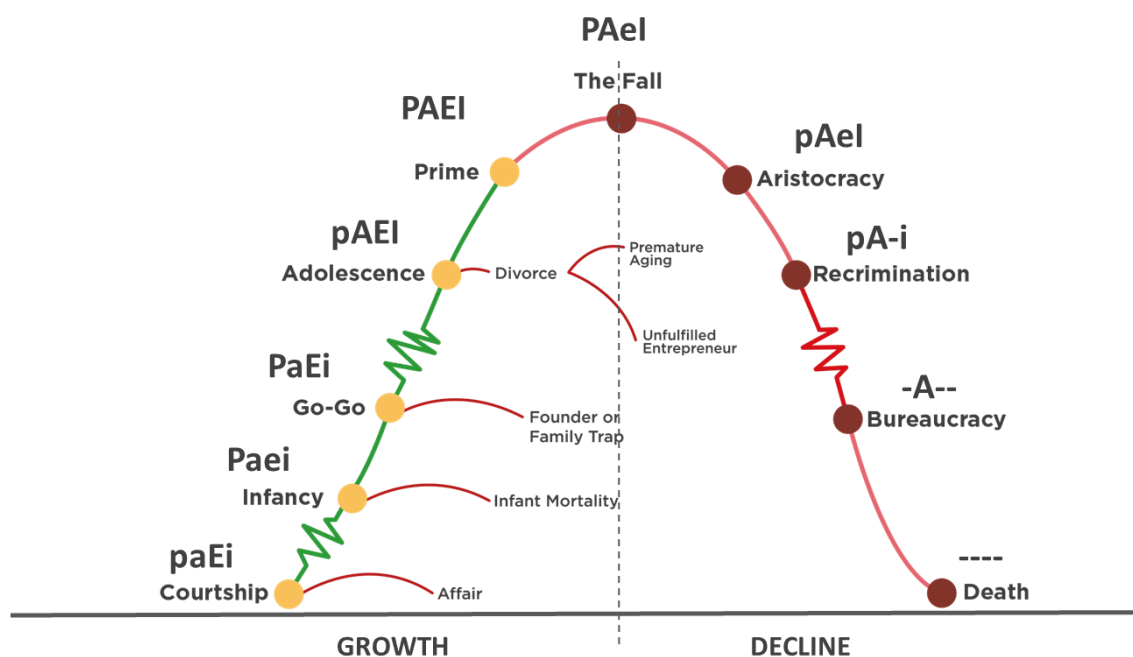


Figure 4. Adizes's life cycle model and PAEI management roles

Source: Own compilation based on ADIZES (2004b), 2022

Some companies get stuck at a given stage, while others skip stages. The literature also proves that the life cycle of organizations, and within this, Hungarian SMEs, is constantly bordered by crisis points. Although the presented organizational life cycle models and the PAEI framework are suitable for a certain degree of analysis, they can usually not be used independently; they can be used by applying several models together (Q3). According to

research, the definition of the life cycle of companies depends on many factors, so there are not always sharp boundaries between the individual development stages. Another disadvantage is that they primarily focus only on internal, growth-related problems while ignoring the effects of the external environment. Accordingly, it remains questionable how to determine an organisation's position in the corporate life cycle model based on objective data and what "help" a start-up can receive to avoid crisis points.

H1: The position of a start-up cannot be precisely determined in organisational life cycle models, and therefore, an organisation cannot match the characteristics of each stage to itself, so it is not of real help to management. A hipotézist a szakirodalmi szintetizálás révén igazolni tudtam így elfogadom.

I proved the hypothesis through literature synthesis, so I accepted it. According to the literature, objectivity can be helped by a management framework or method that approaches it from a different perspective, holistically, so during the research, I looked for a tool that can be used for a more accurate, objective assessment of the characteristics of an organisation, with the help of which it can be identified in which stage of its organisational life cycle an enterprise is.

Table 2. Grouping of the processed management frameworks from the perspective of the organisational assessment of start-up SMEs

Chapter	Name	Specific management approach	Application area	Organisational Life Cycle			Holistic approach	Provide Comparability
				Start-up	Growth	Maturity		
2.5.1.	Balanced Scorecard model	Strategic Management, Performance Management	General		x	x	x	
2.5.2.	TQM	Quality Management	General		x	x	x	
2.5.3.	EFQM model	Organizational Excellence	General	x	x	x	x	x
2.5.4.	OKR	Strategic Management	Innovative Enterprises	x	x		x	
2.5.5.	Performance Prism	Performance Management	General		x	x	x	x
2.5.6.	Skandia Navigator	Performance Management	General		x	x		
2.5.7.	BMC Business Model Canvas	Business Modeling	Start-ups	x			x	
2.5.8.	ISO 9001	Quality Management	General		x	x	x	
2.5.9.	Hosin Management	Process Management	Innovative Enterprises	x	x		x	
2.5.10.	Performance pyramid	Performance Management	General		x	x		
2.5.11.	Agilie management	Project Management	General	x	x	x		
2.5.12.	Design thinking	Project Management	Innovative Enterprises	x	x	x		
2.5.13.	Lean principles & Lean start-up method	Quality Management, Business Modelling	Start-ups & Innovative Enterprises	x			x	

Source: own editing, 2023

Sustainable Development Goals (SDG) as the agility and value proposition. From this, the economic and management terms based on the latest research in the EFQM 2020 model are difficult to interpret for the average entrepreneur. Consequently, self-assessment using it is not easy to implement, even for entrepreneurs with economic and management knowledge without help (Q5).

H2: The EFQM model can be used by organisations of any size, whether a small or medium-sized enterprise or a large company. I could not prove the hypothesis based on the results obtained from the primary studies for the analysed sample.

The results show in several ways that the formulations of the statements are challenging to understand, and self-assessment using them is difficult to implement even for entrepreneurs with economic and management knowledge without help. Based on the research, I recommend that a simpler, more transparent model be prepared for start-up micro-enterprises and that the applied approaches and formulations be more understandable. All this is done to assess the organisational characteristics of micro-enterprises. It is possible for an average entrepreneur with less management knowledge to assess start-up businesses independently without help. Consequently, I had to create a simplified assessment model based on the structure and logic of the EFQM 2020 model for the assessment of start-up businesses. I used two statements as criteria in the simplified assessment model, the details of which are presented in Table 3.

3. táblázat: A vizsgálati modell egyszerűsített meghatározásainak kialakítása részlet

#	<i>EFQM 2020 model</i>	<i>Own Testing model</i>
I.	Purpose, Vision & Strategy	
1.1	Define Purpose & Vision	
	<ul style="list-style-type: none"> • Defines a Purpose that provides an inspirational motive for the importance and value of its work and is appealing to all its stakeholders 	1. I have defined a mission* for my business that is inspiring and clear to everyone.
	<ul style="list-style-type: none"> • Identifies areas where outstanding and sustainable performance levels must be achieved to fulfil the Vision. 	2. My business has the capabilities necessary to realise the vision*
	<ul style="list-style-type: none"> • Involves its stakeholders in defining, shaping and communicating its Purpose and Vision 	
	<ul style="list-style-type: none"> • Uses its Purpose to create an aspirational Vision that resonates with its stakeholders 	
	<ul style="list-style-type: none"> • Understands the importance of its Purpose being acknowledged as a force for good in its ecosystem 	
	<ul style="list-style-type: none"> • None of them apply to my business 	

Source: own study, 2023

The research model I have developed – if confirmed by quantitative research – can be a Development, Self-Assessment and Review Tool for Small and Medium-sized Enterprises. Therefore, according to its English translation (Developmental self-Assessment and Review Tool for SMEs), it was named the DARTS model. Besides offering a graphically and visually clear metaphor for analyzing the organizational characteristics of SMEs and exploring development opportunities, the acronym is well suited to the model's goals. Serving as a simplified diagnostic tool, it can provide a quick overview of the state of the enterprise. It can help SMEs to see their organizational performance and development opportunities quickly and thus use their resources in a targeted manner in the areas of development with the most significant impact. The structure of the model follows the structure of the original model, i.e. it retains the system of criteria and criterion parts, as well as its logic, with the main difference that the criterion parts are accompanied by only 2-2 simplified statements developed along the above methodology, more tailored to the starting small and medium-sized enterprise. The structure of the DARTS model is presented in Figure 6.

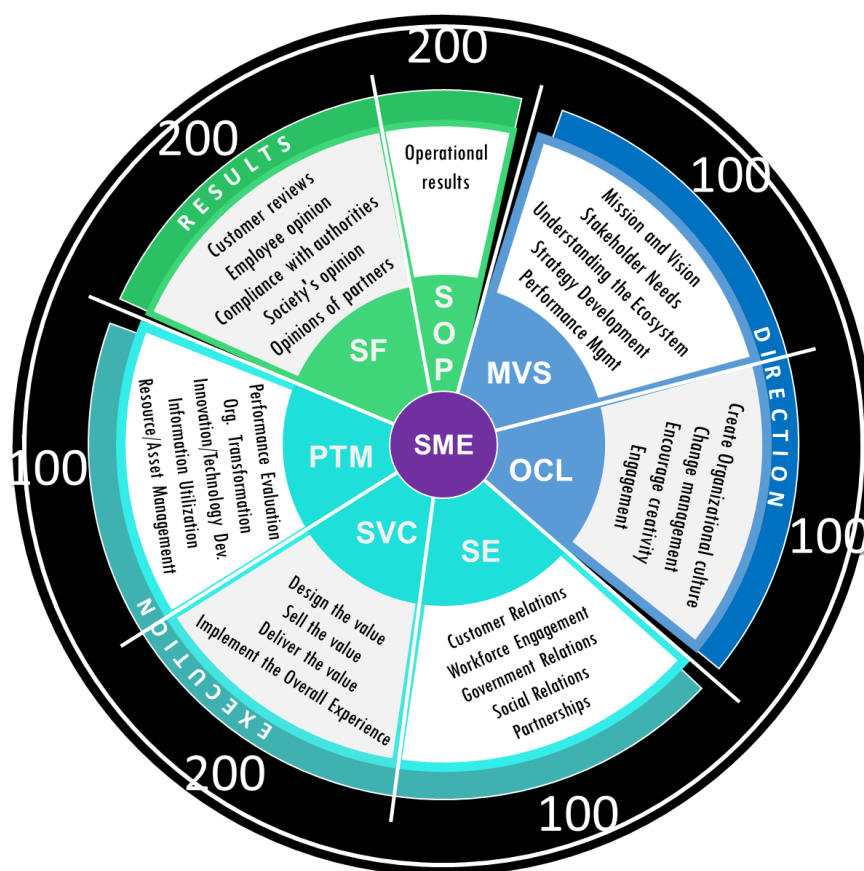


Figure 6. Structure of the DARTS model

Source: own compilation, 2023

Similar to the EFQM 2020 model, the DARTS model also includes seven criteria, which provide the “sectors” of the model:

- | | |
|--|--|
| 1. Mission, vision and strategy (MVS) | 5. Performance and transformation management (PTM) |
| 2. Organizational culture and leadership (OCL) | 6. Stakeholder feedback (SF) |
| 3. Stakeholder engagement (SE) | 7. Strategic and operational performance (SOP) |
| 4. Sustainable value creation (SVC) | |

The simplified names of the criterion parts related to the criteria in each sector can be read. Following the seven criteria of the DARTS model, respondents can give their company a maximum of 10 points per criterion part, which can be used to achieve a total of 600 points during the self-assessment. In order to maintain the 1000-point maximum of the original model and the ratio of criteria, different weights had to be applied to the DARTS model. The applied weights are listed in Table 4.

Table 4 Weighted scoring of the DARTS model

#	Model criterion	Criterion section	Nr. of questions	Max. points	Weight	Total
I.	Mission, vision & strategy (MVS)	5	10	10	1	100
II.	Organizational culture & leadership (OCL)	4	8	10	1,25	100
III.	Stakeholder engagement (SE)	5	10	10	1	100
IV.	Sustainable value creation (SVC)	4	8	10	2,5	200
V.	Performance & transformation management (PTM)	5	10	10	1	100
VI.	Stakeholder feedback (SF)	5	10	10	2	200
VII.	Strategic & operational performance (SOP)	-	4	10	5	200
	Összesen		60	-	-	1000

Forrás: saját összeállítás, 2023

During the survey conducted between 2022.06.28. and 2022.08.30. based on my research model, the DARTS model, developed through the above validation, I sent my questionnaire to the e-mail addresses of 2,074 organizations in the target group, which I repeated once more due to the low willingness to complete in the first round. With this, 303 completed questionnaires were returned, of which one respondent was excluded due to incomplete completion. The cleaned database, therefore, contains the responses of 302 organizations, the distribution of which, according to background variables, is shown in Table 4.

Table 4. Main demographic characteristics of the sample

Characteristics		Distribution of sample	
		n=302	%
Education	Primary school	7	2,3%
	Other	11	3,6%
	College or university	98	32,5%
	High school	71	23,5%
	Vocational school	32	10,6%
	Vocational secondary school/Technical School	83	27,5%
Age group	18-24 years old	38	12,6%
	25 -30 years old	109	36,1%
	31-40 years old	71	23,5%
	41-50 years old	50	16,6%
	51-60 years old	25	8,3%
	Over 60 years old	9	3,0%
Legal form	LLC (Limited Liability Company) KATA	21	7,0%
	Primary enterprise (KATA)	255	84,4%
	Primary enterprise (SZJA)	19	6,3%
	LLC (Limited Liability Company)	7	2,3%
Employee	I work with 1 employee	15	5,0%
	I employ 2-3 people continuously	12	4,0%
	My business has 4 or more employees	5	1,7%
	No, I run the business alone	231	76,5%
	Yes, but only periodically	39	12,9%
Business experience	Less than 1 year	131	43,4%
	1 year	164	54,3%
	2 years	1	0,3%
	More than 2 years	6	2,0%

Source: own study, 2023

The supported micro-enterprises in the sample preferred the service sector based on their chosen main activity. Within this, many chose cosmetics and beauty care (11.55%) and online commerce (6.33%), typically creating a webshop. The sample is not representative, so the findings only apply to the organizations in this sample. Based on the data in the table, about a third of the 302 foremost entrepreneurs who responded have a higher education. At the same time, the proportion of secondary school graduates, i.e. those who have completed secondary vocational school and grammar school, makes up more than half of the sample, 51%, while those with lower education represent themselves with about 20%. In terms of the age composition of the sample, young entrepreneurs stand out; almost 39% of the sample is under the age of thirty, but representatives of the 30-50 age group are also present in the

sample in very similar numbers. Start-up businesses typically start their activities as micro-enterprises, mainly as sole proprietorships, so it is unsurprising that representatives of this legal form are present in more than 90% of the sample. Almost 85% chose the KATA taxation form, which was popular until 2022. One of the defining demographic characteristics from the research point of view is entrepreneurial experience since my research goal stated above is to explore the organizational characteristics of the position in the organizational life cycle, and within this, the Adizes organizational life cycle model. An essential factor is that 97.7% of the responding enterprises have a maximum of 2 years of experience; within this, 131 enterprises have not even completed a closed business year, while 164 have not completed their second business year. Developing a new research model always poses risks for researchers, especially since, in my case, it was derived from a model with a severe history and highly high knowledge adaptation. With this in mind, it was even more critical for me to examine the validity and reliability of the DARTS model built on the logic of EFQM, which I measured using Cronbach's Alpha and paired sample t-test. According to the opinion of the respondents participating in the self-assessment, based on the reliability analysis of the model's scale, it can be stated that the simplified assessment model based on the EFQM 2020 model proved to be reliable based on Cronbach's alpha values both at the level of the criteria and at the level of the criterion parts. Examining the organizational characteristics by criterion, the high scores given to the criterion parts are reflected, so only minimal differences can be detected between them. Based on the aggregated results, considering the median and average values, the highest scores were interestingly given to the III. criterion of the DARTS model, Stakeholder Involvement, although it was only slightly ahead of the IV. Sustainable Value Creation criterion, and the third V. Performance and Transformation Management criterion (Figure 7.). Overall, this result meets expectations since all three criteria are related to the implementation pillar, i.e., the primary question is the “How” question, and the product and the production of value are clear priorities for a start-up. VII follows the order of the criteria: strategic and operational performance, and VI. Stakeholder opinions, which is also logical from the organization's point of view, since the results, mainly customer results and the development and monitoring of performance indicators, are unquestionably crucial for a start-up company.

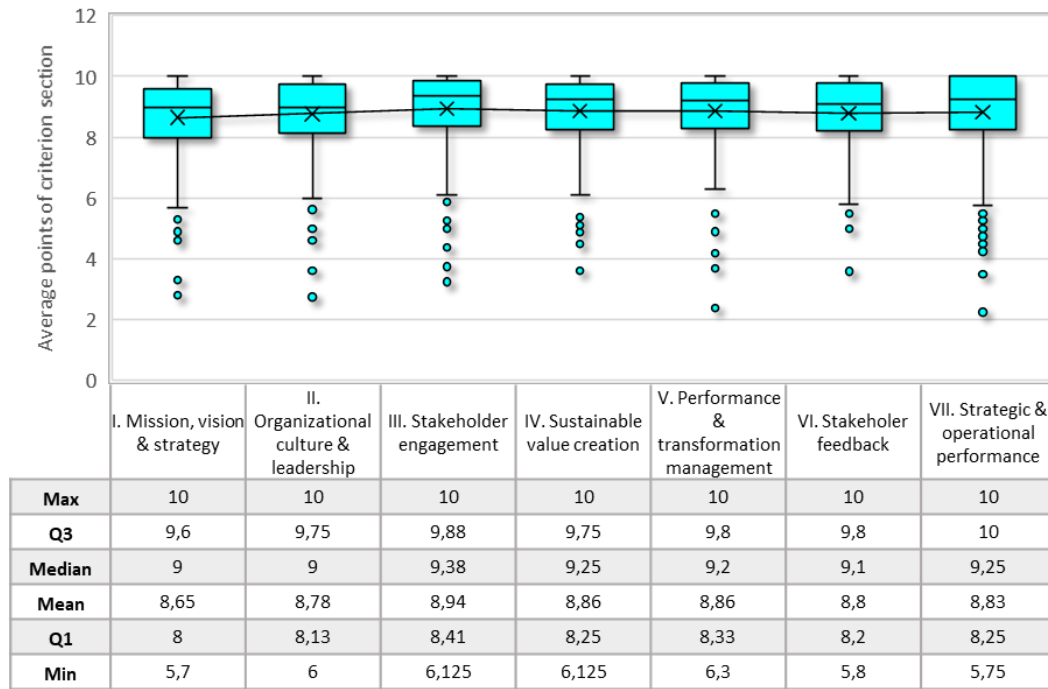


Figure 7. Results of the criteria level (n=302)

Note: Max = maximum value, Q3 = upper quartile (75%), Q1 = lower quartile value (25%), Min= minimum values without outliers

Source: own study, 2023

The order of the criteria is then followed by II. Organizational culture and leadership and I. Vision, mission and strategy, albeit with minimal differences. This result is confirmed by the Friedman test and the paired sample t-test (Table 5).

Table 5. Results of the paired t-test of the criterion (n=302)

Model criterion		II. OCL	III. SE	IV. SVC	V. PTM	VI. SF	VII. SOP
I. Mission, vision and strategy	<i>t</i>	-2,816	-5,253	-3,754	-3,951	-2,429	-2,770
	<i>p</i>	0,003	0,000	0,000	0,000	0,008	0,003
II. Organizational culture & leadership	<i>t</i>		-3,258	-1,772	-1,798	-0,363	-0,774
	<i>p</i>		0,001	0,039	0,037	0,358	0,220
III. Stakeholder engagement	<i>t</i>			1,466	1,604	2,576	1,565
	<i>p</i>			0,072	0,055	0,005	0,059
IV. Sustainable value creation	<i>t</i>				0,022	1,352	0,481
	<i>p</i>				0,491	0,089	0,315
V. Performance & transformation management	<i>t</i>					1,307	0,475
	<i>p</i>					0,096	0,318
VI. Stakeholders feedback	<i>t</i>						-0,508
	<i>p</i>						0,306
VII. Strategic & operational performance	<i>t</i>						
	<i>p</i>						

Note: N = 302, df=301, Source: own study, 2023

Subsequently, I conducted a multivariate regression analysis, where the regression model of the total score of the start-ups at a 10% significance level is described by the following equation (based on Table 6), which was able to explain approximately 13.9% of the total scores derived from the self-assessments:

$$Y_{SUM(10\%)} = 56,113 + 2,769 (X_{Employee}) + 2,474 (X_{MIN Collage}) + 6,437 (X_{KATÁS}) - 6,762 (X_{NGA_N}) - 2,936 (X_{MIN_F}) - 7,427 (X_{MIN_J}) - 3,794 (X_{MIN_R}) - 3,764 (X_{MIN_M}) - 3,745 (X_{MIN_I}) - 9,083 (X_{MIN_4years}) - 18,425 (X_{MIN_3years}) + \varepsilon$$

Table 6. Results of the multivariate linear regression analysis

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant	58,598	3,012		19,452	0,000
Employee	2,770	1,073	0,158	2,582	0,010
MIN Vocational school	-2,648	2,471	-0,067	-1,071	0,285
MIN Technical School	0,881	1,395	0,044	0,631	0,528
MIN High school	1,190	1,180	0,080	1,008	0,314
MIN Collage	1,843	1,249	0,116	1,475	0,141
KATA	6,004	1,583	0,235	3,794	0,000
Primary EP or LLC	0,386	1,448	0,016	0,267	0,790
NGÁ_N	-3,251	1,651	-0,123	-1,969	0,050
NGÁ_F	-2,989	1,924	-0,098	-1,553	0,121
NGÁ_C	-0,432	1,867	-0,014	-0,231	0,817
NGÁ_Q	3,141	4,298	0,042	0,731	0,465
NGÁ_J	-8,289	2,449	-0,200	-3,385	0,001
NGÁ_L	-1,929	4,281	-0,026	-0,451	0,653
NGÁ_G	-1,091	1,263	-0,059	-0,864	0,389
NGÁ_R	-4,221	2,122	-0,115	-1,990	0,048
NGÁ_P	-1,056	2,082	-0,030	-0,507	0,612
NGÁ_K	-9,445	7,039	-0,073	-1,342	0,181
NGÁ_M	-4,241	1,540	-0,185	-2,755	0,006
NGÁ_I	-4,402	2,270	-0,116	-1,939	0,054
NGÁ_H	0,423	2,288	0,011	0,185	0,853
MIN_2év	-1,091	0,859	-0,073	-1,270	0,205
MIN_4év	-10,211	3,204	-0,192	-3,187	0,002
MIN_3év	-19,854	7,213	-0,154	-2,753	0,006
F	2,931				
korrR²	0,129				
N	302				

Note: $NG\acute{A}_S$ omitted from the sample due to the largest number of elements, B = coefficient, $Std. B$ = standardized B, F = F-test value, $corrR2$ = corrected coefficient of determination, N = number of elements, Source: own study, 2023

At a significance level of 10%, if the business has employees, its manager has a higher education or is taxed, according to KATA, this increases the total score. At the same time, other factors hurt the overall result. According to the regression model, the most significant negative effect on the total self-assessment score according to the study model can be demonstrated in connection with entrepreneurial experience, especially more than 3 years of entrepreneurial experience. I was curious about how the variables affect the total self-assessment score at a 5% significance level in the regression study. So, I cleaned the data further, i.e. I iteratively examined the factors with no natural effect.

Table 7 Results of the regression study

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant	57,187	1,438		39,763*	0,000
MIN_collage	2,134	0,969	0,135	2,203*	0,028
KATÁS	5,152	1,454	0,201	3,543*	0,000
NGÁ_J	-6,762	2,351	-0,163	-2,877*	0,004
NGÁ_M	-3,062	1,362	-0,134	-2,249*	0,025
MIN_3years	-10,202	2,779	-0,207	-3,671*	0,000
F	8,544				
korrR²	0,111				
N	302				

Note: B = coefficient, $Std. B$ = standardized B, F = F-test value, $corrR2$ = corrected determination coefficient, N = number of elements, * significant at 5%.

Source: own study, 2023

Based on the results of Table 7, the overall (total) performance score of the start-ups in the sample studied could be described by the following equation at a 5% significance level, which could explain approximately 11.1% of the total score of the model.

$$Y_{SUM(5\%)} = 57,187 + 2,134 (X_{MIN_Collage}) + 5,152 (X_{KATÁS}) - 6,762 (X_{NGA_J}) + 3,062 (X_{MIN_M}) - 10,202 (X_{MIN_3years}) + \varepsilon$$

Based on this, five explanatory variables have the most significant impact on the total score of the self-assessment according to the research model. The most surprising of these is that those with higher education give a higher score to their performance compared to other

businesses by slightly more than 2.1 points. In comparison, KATÁS entrepreneurs give a higher performance score than other businesses by more than 5 points. On the other hand, there is a significantly demonstrable negative impact on the total score of businesses if the given entrepreneur carries out his/her activities in the field of information and communication or professional, scientific, and technical activities. According to the regression model, the most significant negative impact on the total score can be demonstrated in connection with entrepreneurial experience, significantly more than 3 years of entrepreneurial experience. Since the DARTS model uses average values, similar to the EFQM 2020 model, we can obtain an approximate value by weighting it, which makes it comparable with the scores of the original model (Figure 8).

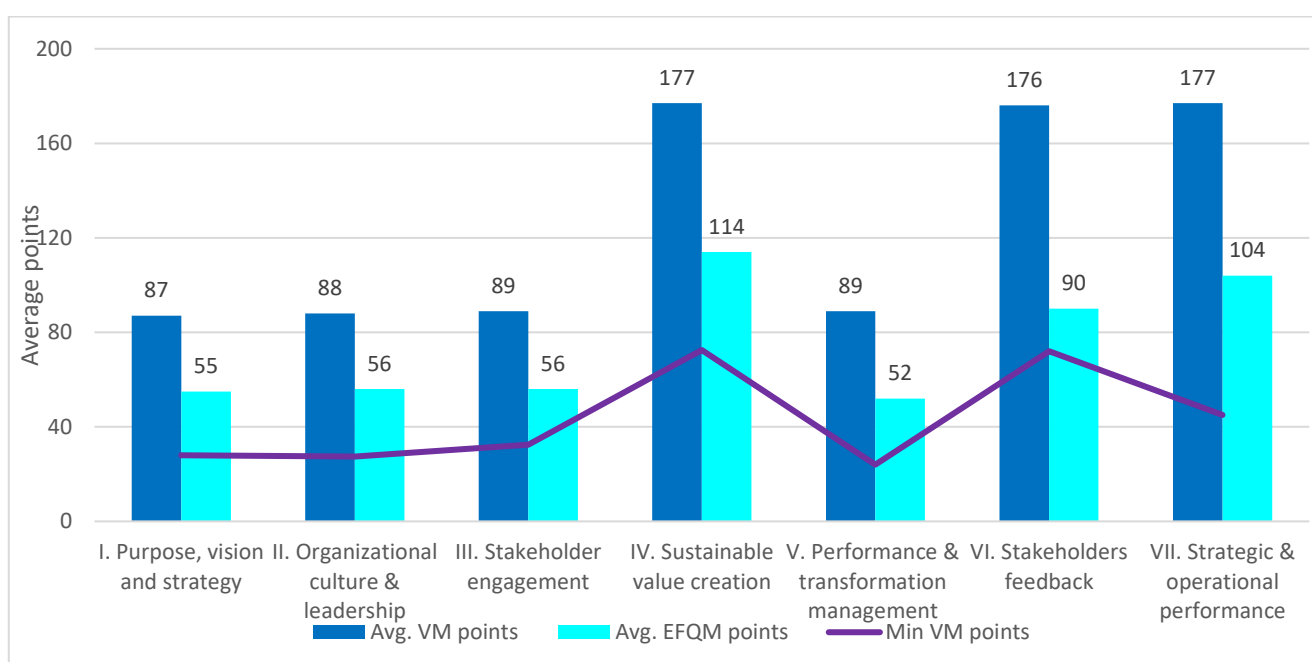


Figure 8. Comparison of average scores according to the DARTS model and the first year of application of the EFQM 2020

*Source: own compilation based on EFQM.org, 2021
(<https://knowledgebase.digitalefqm.com/content/840-efqm-scoring-analysis>)*

Based on the weighted scores of the model, in addition to the above, it can be stated that the respondents gave almost maximum points in almost all criteria, which can be considered extremely high when compared to the results of organizations participating in the European Excellence Award and the National Excellence Award.

Based on the above results, the DARTS model can provide an image of the characteristics of an organization, which is proven by statistical methods. In addition, the self-assessment

results of the entrepreneurs in the sample are overestimated compared to the expert assessments (Q6), which can be the result of three reasons. One reason may be start-ups' extraordinary ambition and self-confidence in the initial stage of the enterprise, which gives their enterprise higher scores. However, it may also clearly indicate a lack of experience and/or knowledge, which makes them unable to interpret the criteria and expectations correctly. However, the use of an inappropriate measuring tool can also have such an effect since the respondents did not evaluate the findings with the RADAR tool used by EFQM evaluators during the assessment but followed a simple scale method (i.e. 1 - not true at all, while 10 - entirely true).

H3: Based on the logic and structure of the EFQM 2020 model, the simplified DARTS model developed in this research can be used to assess the organisational characteristics of a start-up enterprise. I confirmed the hypothesis with the results obtained from the primary studies regarding the analysed sample, so I accepted it.

I surveyed researchers to connect the criteria system of the DARTS model and the Adizes PAEI model to identify its place in the organisation's life cycle. Based on the expert responses, I developed a weight system, which I assigned to the findings of the sub-criteria of my EFQM-based study model, with which I performed a Friedmann test rank correlation (Table 8).

Table 8. Difference in PAEI roles

Variables	Mean	St. dev.	N	R
P_IMP	11,61	1,55	302	3,997***
A_IMP	9,39	1,18	302	2,997***
E_IMP	7,98	1,14	302	1,977***
I_IMP	7,14	0,94	302	1,030***

*Note: N = number of elements, R=average rank of variables
***Significant at 0.1%.*

Source: own study, 2023

The Friedman test clearly shows that there is a significant difference between the different roles (χ^2 ([3], N = [302] = 894.861, $p < .001$). Based on the results of the DARTS model and the examination of the correlations of the PAEI framework, it can be stated that a “tangible” order can be demonstrated regarding management roles, i.e. there is a clear

correlation between the two models (Q7). In order to find out which of the criteria of the test model increases the importance of each PAEI role the most, I performed parametric and non-parametric correlations. According to the parametric correlation, a significant difference can also be demonstrated between the individual roles.

Table 9. Examination of the correlation between models using a parametric procedure

	A_IMP	E_IMP	I_IMP	MVS	OCL	SE	SVC	PTM	SF	SOP
P_IMP	0,931**	0,921**	0,96**	0,805**	0,862**	0,831**	0,928**	0,865**	0,876**	0,777**
A_IMP		0,934**	0,949**	0,863**	0,871**	0,899**	0,855**	0,884**	0,814**	0,728**
E_IMP			0,945**	0,907**	0,887**	0,826**	0,836**	0,906**	0,801**	0,723**
I_IMP				0,842**	0,898**	0,891**	0,863**	0,886**	0,903**	0,743**
MVS					0,83**	0,742**	0,718**	0,754**	0,681**	0,68**
OCL						0,781**	0,783**	0,800**	0,731**	0,632**
SE							0,758**	0,799**	0,714**	0,621**
SVC								0,801**	0,762**	0,609**
PTM									0,761**	0,630**
SF										0,655**

Note: N = 302, ** significant at 1%.

Source: own study, 2023

Looking at the study results in Table 9, it can be stated at first glance that the criteria of the DARTS model, to different extents, contribute to the emergence of individual PAEI management roles.

Table 10. Examination of the relationship between models using a non-parametric method

	A_IM P	E_IM P	I_IMP	I. MVS	II. OCL	III. SE	IV. SVC	V. PTM	VI. SF	VII. SOP
P_IMP	0,905**	0,907**	0,955**	0,760**	0,846**	0,782**	0,897**	0,814**	0,872**	0,777**
A_IMP		0,905**	0,929**	0,841**	0,840**	0,863**	0,808**	0,820**	0,792**	0,731**
E_IMP			0,926**	0,863**	0,852**	0,764**	0,804**	0,864**	0,764**	0,725**
I_IMP				0,803**	0,879**	0,853**	0,843**	0,828**	0,897**	0,732**
I.MVS					0,792**	0,701**	0,681**	0,715**	0,636**	0,669**
II.OCL						0,748**	0,772**	0,758**	0,714**	0,629**
III.SE							0,733**	0,727**	0,693**	0,632**
IV.SVC								0,741**	0,735**	0,608**
V.PTM									0,696**	0,634**
VI.SF										0,644**

Note: N = 302, ** significant at 1%.

Source: own study, 2023

The results of the non-parametric correlation are included in Table 10, which overall shows very similar relationships to the results of the parametric correlation. According to this, the

P role stands out first, as it has the highest average rank. Examining the individual roles separately, it is clear that the IV. criterion “Sustainable value creation” contributes the most to the P role, which is fundamentally consistent with the management roles of the “infancy” and “go-go” eras in the Adizes life cycle model. However, the A role only appears dominantly in the “Adolescence” in the Adizes life cycle theory and parallel with the E and I roles, so the advancement of the role does not confirm the theoretical model. However, it can also be stated that the start-ups in the sample received grant funding, which naturally led to higher administrative expectations. Another reason for the more pronounced appearance of role A was formulated by ADIZES (1992), who believes that the role creates short-term success for the enterprise by mastering entrepreneurial routines.





In contrast, according to the literature, role E is the role of long-term thinking and goal development, so the relationship of the two models with the I. KJS criterion is fundamentally correct. The fourth role is occupied by the role I based on the ranks, which corresponds to Adizes's life cycle theory since it specifically links the dominant appearance of the role to the "adolescence" of the organisation.

H4: A correlation between the DARTS model criteria and the roles of Adizes management (PAEI) can be shown. According to the primary studies, the parametric and non-parametric correlation analysis for the analysed sample can confirm a strong correlation between the two models, so I accept the hypothesis.

Through the relationship between the PAEI framework and the simplified test model, the precise determination of the organisation's position was only partially confirmed in the case of the P role, yes, in the case of the A role, no, in the case of the E role, while in the case of the I role it was confirmed, so I accept the assumption only partially. Through the relationship between the PAEI framework and the simplified DARTS model, the precise determination of the organisation's position was only partially confirmed in the case of the P role, yes, in the case of the A role, and the case of the E role only partially. In contrast, in the case of the I role, it was confirmed. By the above, the preliminary expectations were only partially confirmed, which could have been caused by the particular situation of the sample mentioned above, due to the grant, the problem of measurement, or even simply the difficulty of self-assessment. For these reasons, I conclude that start-ups cannot apply the model properly on their own without help, which means that although it can be used as a

kind of “medical record” when used correctly, it cannot be used as a self-assessment tool (Q8). In order to examine the hypotheses formulated based on the information from my research, which was based on exploratory literature and personal and online questionnaire surveys, I evaluated the results of the causal empirical research. The research results, supported by statistical and mathematical methods, confirmed three of my hypotheses, while one was not confirmed (Table 11).

Table 11 Testing the hypotheses of my research

Research hypotheses	Verification of hypotheses
H1: The position of a start-up cannot be precisely determined in organisational life cycle models, and therefore, an organisation cannot match the characteristics of each stage to itself, so it is not of real help to management.	verified 
H2: The EFQM model can be applied by organisations of any size, whether small, medium-sized or large.	did not verified 
H3: Based on the logic and structure of the EFQM 2020 model, the simplified DARTS model developed in this research can be used to assess the organisational characteristics of a start-up enterprise.	verified 
H4: A correlation between the DARTS model criteria and the roles of Adizes management (PAEI) can be shown.	verified 

Source: own study, 2023

4. NEW AND NOVEL RESULTS OF THE DISSERTATION

Based on the results of the analyses and investigations conducted during my research, I present the most critical theses below:

1. While validating the criteria system and findings of the EFQM 2020 model, I demonstrated that the economic and management terms used in the model are difficult to interpret for an average entrepreneur. Consequently, self-assessment using it is not easy to implement, even for entrepreneurs with economic and management knowledge without help.
2. Based on the structure and logic of the EFQM 2020 model, I created a simplified assessment model, the DARTS model, for assessing start-ups, with which the characteristics of an organisation can be examined, which is proven by statistical methods.
3. The self-assessment results of the entrepreneurs in the sample are overestimated compared to expert assessments, which may result from the extraordinary ambition and self-confidence of the start-ups' lack of experience and/or knowledge. However, they may also indicate the inadequacy of the measuring tool.
4. Based on the results of the DARTS model and the examination of the relationships of the PAEI framework, a strong correlation can be demonstrated in terms of the criteria of the simplified self-assessment model and management roles.

5. PRACTICAL APPLICABILITY OF THE RESULTS

One of the main goals of preparing the dissertation was to carry out scientifically demanding research that practical analysts and start-up companies can use, which can be adapted to assess their operation and organisational characteristics and provide interpretable results from the perspective of development processes. I will describe the practical applicability of the results from secondary and primary studies below:

1. Based on the literature, it can be stated that the number of both newly founded and existing companies shows a decreasing trend after the increase in recent years. Based on the literature, it can be stated that behind these lies the unstable, volatile environment and the lack of competitiveness, which is also attributed to the loss of flexibility and the lack of leadership skills. Based on this, they need to be supported financially and professionally.
2. The definition of the life cycle of organisations depends on many factors, so there are only sometimes sharp boundaries between the individual development stages. They primarily focus only on internal, growth-related problems while ignoring the effects of the external environment. Accordingly, it is impossible to use any valuable information to explore the situation of an enterprise in itself, both for professionals working in education and in the field of organisational development.
3. According to the literature, objectivity can be helped by a method that uses a holistic approach from a different perspective, so during the research, I examined and grouped the 13 management frameworks most frequently used among SMEs so that the given approach can be applied to the self-assessment of start-ups.
4. During the validation of the criteria system and findings of the EFQM 2020 model, it was proven that the economic and management terms used in the model are difficult to interpret for an average entrepreneur. Consequently, self-assessment using it is not easy to implement, even for entrepreneurs with economic and management knowledge without help. Thus, further emphasis should be placed on the development and training of experts working with the model, as well as on the long-term deepening of entrepreneurial skills and knowledge.
5. Based on the structure and logic of the EFQM 2020 model, I created a simplified testing model, the DARTS model. I proved with statistical methods that it is suitable for

assessing the organisational characteristics of a start-up small and medium-sized enterprise. The DARTS model can help professionals working in organisational development, especially micro and small enterprises, to diagnose their organization.

6. However, the self-assessment results of the entrepreneurs in the sample were overestimated compared to the expert assessments, so the start-up enterprises “cannot let go of their hands”, they cannot apply the simplified model properly on their own without help, and expert support is necessary.

6. LIST OF PUBLICATIONS RELATED TO THE DISSERTATION



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Candidate: Balázs Darnai
Doctoral School: Doctoral School of Management and Business
MTMT ID: 10081670

List of publications related to the dissertation

Articles, studies (7)

1. **Darnai, B.**, Kotsis, Á., Dajnoki, K.: Ezüstlakodalom vagy válás: hogy áll a Balanced Scorecard és a megújult EFQM 2020 modell kapcsolata.
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List of other publications

Articles, studies (2)

8. Kotsis, Á., Horváth, A., **Darnai, B.**: Do they have really no opinion? - The evaluation of student partnership using Kano-model.
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Conference presentations (2)

10. **Darnai, B.**, Kotsis, Á.: EFQM 2020 alapú értékelési modell alkalmazási lehetősége induló vállalkozásoknál.
In: 3. Farkas Ferenc Nemzetközi Tudományos Konferencia: "Menedzsment forradalmak": Absztraktkötet. Szerk.: Benke Mariann, Schmuck Roland, Riedelmayer Bernadett, Pécsi Tudományegyetem Közgazdaságtudományi Kar Vezetés- és Szervezéstudományi Intézet, Pécs, 91, 2022, (VSZI kötetek, ISSN 2786-3891) ISBN: 9789634299806
11. Kotsis, Á., **Darnai, B.**: Munkával szembeni elvárások vizsgálata a Kano-modell alapján.
In: 3. Farkas Ferenc Nemzetközi Tudományos Konferencia: "Menedzsment forradalmak": Absztraktkötet. Szerk.: Benke Mariann, Schmuck Roland, Riedelmayer Bernadett, Pécsi Tudományegyetem Közgazdaságtudományi Kar Vezetés- és Szervezéstudományi Intézet, Pécs, 86, 2022, (VSZI kötetek, ISSN 2786-3891) ISBN: 9789634299806

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