

INTUITIVE DECISION: WHEN TO BEGIN THE SUCCESSION PROCESS

“Though by forebears well provided,
He just barely does exist,
Of the things that would be needed,
He has nothing, long the list.
Not his fault, he’s Magyar, in his
Land there is a shibboleth,
Which since ancient times declared that:
‘There’s plenty of time for that!’”

Mr Pato – Alexander Petőfi translated by Kery, L. A.

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ABSTRACT: *The aim of the paper is to increase understanding of the succession decision-making process in family businesses. In understanding this phenomenon on the personal level of reality and understanding the decision-making process involved in succession, the decision-maker’s thought process and aspirations have to be taken into consideration. Based on a survey, a knowledge-based expert system tool (Doctus) was used to order successors’ intuitive knowledge and aspirations in order to deepen our understanding of the succession decision-making phenomenon. The diversity of the identified rules suggests that first generational change does not happen according to a single model but rather a variety of pathways are followed, depending on the context.*

KEYWORD: *family business, succession, aspirations, intuitive decision*

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INTRODUCTION

Many of us tend to procrastinate. Human beings are intuitive thinkers and human intuition is imperfect, with the result that judgments and choices often deviate substantially from the predictions of normative statistical and economic models. Homo economicus, on the other hand, is rational. In this paper, I study how to model behavior that is irrational according to the classical economic interpretation. According to Herbert A. Simon (1977), decisions are intended to be rational, but are bounded by cognitive biases. James G. March (1978) claims that the driving forces of decisions are expectations, incentives, and desires. Daniel Kahneman's (2011) thoughts inspired me in several ways, and in the search for mindset patterns I reflected on concepts like intuitive knowledge and planning fallacy. However, according to Ariely and Jones (2008), expectations shape stereotypes. The latter author argues that "[w]e don't even know what we want to do with our lives – until we find a relative or a friend who is doing just what we think we should be doing" (Ariely–Jones 2008).

In this paper I illustrate the mindset patterns of a self-interested decision-maker; i.e., the predecessor, who sometimes – after a certain period of time – changes his/her mind, i.e., makes intertemporally inconsistent decisions. Since the spread of neoclassical economics, frequently used models and examples have been based on the assumption of rational behavior, but experimental and behavioral economics and psychology show, based on everyday patterns, the latter has less and less legitimacy as an exclusive idea. The aim was to find acceptable solutions to decisions in unknown territory within the framework of complex systems.

The data collection took place in Hungary, which being a post-soviet European country represents an excellent location for an exploratory study, since in most family businesses in the country the first generational changes are happening nowadays, or will be happening in the near future. The main method of data collection used in this exploratory study was a survey which I used to build a conceptual framework. I made use of my insider view since I work in a family business that is in the process of the first generational change when making sense of the data. I analyze the data, searching for patterns (sets of rules), in order to understand the process of succession. Based on my experience with the data I challenge the unitary construct assumption adopted by the vast majority of studies on succession in the field of family businesses. In other words, I suggest that there is no single model that describes all generational changes. Instead, I suggest that we need different models to describe succession phenomenon under different circumstances, as

all the conditions are impossible to account for within a single model. By accepting that there is no comprehensive model, predecessors can focus on what decision aspects are worth considering in relation to their particular set of circumstances, rather than searching for a single comprehensive model. The impossibility of the application of the single-model approach that this exploratory research highlights is limited to the scope of the first generational change. An implication of accepting that there is no single model is that the model of the predecessor can include considerations that would not be applicable in relation to subsequent generational change. Being an exploratory study with interpretivist epistemological framing, the findings are not generalizable, but they do provide a basis for a potential explanation of the succession phenomenon and suggest ways of further developing theory and/or action.

This paper is organized as follows: the theoretical background section presents a short overview of the complexity of family businesses and succession on the one hand, and on the other hand of human decisions, applying a tentative definition of aspiration levels and the intuitive decision-making process. The following section describes the methodology, wherein the use of a knowledge-based system (KBS) as a method is described. The findings of the analysis are presented in the section on mindset patterns, followed by a discussion and concluding remarks.

THEORETICAL BACKGROUND

The concept of family business

Family businesses are a highly diversified, heterogeneous group of businesses, which has prompted researchers to develop different classifications to help understand this complexity. Considering the different types of family businesses is important for identifying a valid research sample. The first conceptual framework of family business to be considered is referred to as the two-circle model. This popular model offers a system theory approach to family businesses, which are described through family-business interactions; the interaction between the family subsystem and the business subsystem are characterized as positive or negative. The characteristics of the two subsystems are set out in Table 1.

Table 1. *Areas of conflict between family and business subsystems*

Areas of conflict	Family subsystem	Business subsystem
Goals	development of family members and ensuring their financial background	profit, sales, efficiency, growth
Relations	personal relationships that have priority	impersonal or semi-personal relationships of secondary importance
Regulation	informal expectations (common practice)	written, formalized rules, reward and punishment
Valuation	rewarding family members for their efforts; unconditional love and support	remuneration depends on performance and results, employees can be promoted or dismissed
Succession	as a result of death or divorce	as a result of retirement, promotion or retirement

Source: Dyer (1992)

The result of these interactions is the family business, and the first phase of the literature review provides an overview of definitions of family business. In family business research, the notion of family includes not only the immediate family but also older and younger generations, as well as the branches thereof, such as cousins, uncles and aunts; the family, which includes several generations, is considered a large family group (Gersick et al. 1997). One aspect of demarcation is cultural issues – such as, for example, Latin American and Asian family models, which are very different from Western European ones. Based on the processing of relevant domestic and international literature, I agree with Melin and Nordqvist (2007) that the concept is diverse, and with Littunen and Hirssky (2000) that there is no commonly accepted definition of family business. One aspect of diversity is that there are different views about how to define the concept of family depending on the range and composition of the persons who are related to each other within the family. Family businesses are quite heterogeneous and there is no consensus among researchers about their definition (Chua et al. 1999; Miller et al. 2007). The greatest difficulty with defining family businesses stems from the diversity of family businesses, as this poses the challenge of creating a comprehensive, precise definition that meets both the demands of scientific theory and allows the specific qualities of family businesses to be summarized independently of company size. The consequence of the conceptual confusion in the family business sector is that empirical research has difficulty distinguishing between family and non-family businesses, which raises a number of methodological concerns about issues such as sampling and the comparability of different research results. Therefore, it is useful to become familiar with this diverse conceptual system and review the

qualitative and quantitative characteristics that underlie the distinction between family and non-family businesses (Klein 2000).

Researchers agree that family influence is key to the operation of family businesses, and the interpretation of the term family business shows a mixed picture in this regard. The intensity of the work in the field of definition is clearly illustrated by the fact that between 1989 and 1999 44 different formulations were proposed (Habbershon–Williams 1999), even though these are not general. Handler (1989) is associated with the first conceptual systematization, which identifies four defining aspects in the definitions of family business published between 1964 and 1988.

Litz (1995) suggests that there are “structure-based” definitions that build on the ownership and management structure of family businesses and “intent-based” concepts that build on the values and preferences of family members that involve expressing commitment to the family.

Poutziouris (2001) distinguishes between closed and open definitions, whereby closed definitions are associated with a measurable set of criteria, whereas open definitions refer to the intention to become a family business and self-definition. Rogoff and Heck (2003) associate family business with family ownership, the involvement of family members in management, the role of the family in running the business, and the full involvement of family members of different generations. On this conceptual basis, Chrisman and colleagues (2005) divide definitions of family businesses into two groups: (1) definitions based on participation criteria, such as family ownership, family management, and control by the family, and (2) more restrictive approaches based on the essential elements of the family business that emphasize the particular behavior resulting from family presence. According to Chrisman and colleagues (2005), the criteria for family involvement include family involvement in matters of ownership, supervision, governance and the desire to succeed within the family, while essential elements of family businesses include:

- exercising strategic influence over the family;
- maintaining the vision and control of the family over generations;
- family business behavior (Chrisman et al. 2005);
- and so-called “Familiness.”

Some definitions are less restrictive regarding management issues, and consider a business to be a family business even if the family member owner relinquishes their management function and hires a manager from outside the family to achieve growth goals or ensure survival, for example (Blumentritt et al. 2007). Similarly, in this paper I do not exclude family-owned businesses managed by a professional manager.

As a result of the diversity of family businesses, many classifications have been suggested with the aim of gaining insight into the complex landscape of family businesses. Table 2 summarizes the examined family business typologies (Basco–Pérez Rodríguez 2009; Birley 2001; Corbetta 1995; Davis 2008; Dyer 2006; Lubatkin et al. 2005; Poza–Dagherty 2013; Sharma 2004; Sharma–Nordqvist 2008); I suggest that most typologies rely on a one-sided approach, despite the diversity of family firms.

Table 2. *Summary of family business typologies*

Author(s)	Typing criteria
Gersick et al. 1997	Life cycle
Poutziouris 2001	Future goals
Gomez-Mejia et al. 2001	Level of strategy and trust
Walker–Brown 2004	Reason for founding
Winter et al. 2004	Reason for founding
Dyer 2006	Family and agency cost
Miller–Le Breton–Miller 2006	Strategy
Pittino–Visintin 2009	Innovation and strategy
Dekker et al. 2010	Professionalization and formalization

Source: Based on author's own collection.

The succession process

According to Sharma et al. (2004), about 33% of the family business literature focuses on succession. The succession process has been identified as the most pressing issue for families; after all, this needs to be addressed to enable the successful continuity of the family business within a family from generation to generation (Davis–Harveston 1998; Ibrahim et al. 2001). The following factors have been identified as key contributors to a positive outcome of the succession process: stakeholder satisfaction with the process, business viability, and the subsequent positive performance of the firm (Cabrera–Suárez et al. 2001; Dyer 1986; Handler 1990; Morris et al. 1997; Sharma et al. 2001).

The succession process is influenced by a variety of variables, including non-quantitative ones, which is why it is considered a multidimensional process. The literature focuses on the transfer of shareholder control and ownership, and in particular on the challenges and enablers of this process (De Massis et al. 2008; Le Breton–Miller et al. 2004). In the family business literature, most often covered are the factors that hinder succession, mainly the founder's reluctance, for which many reasons are identified, including the founder's

emotional ties to the business, fear of changing life stages and the passing of time, and other perceived or real forms of self-interest (Cabrera-Suárez et al. 2001; Handler 1989; Lansberg–Astrachan 1994). Other investigated factors include the successor’s competence in business operations, management, and leadership attitude (Barach–Ganitsky 1995). Several authors have also researched the micro-level effects on the success of the transfer process, meaning the direct and dynamic nature of the family and the specific personality traits of the successor and/or predecessor (Lubatkin et al. 2005; Sharma 2004; Sharma et al. 2001). Financial factors such as taxation and internal and external financing can significantly impact the succession process; investment and financial risk have been found to significantly influence the transfer process (Chittoor–Das 2007; Davis–Harveston 1998). There are also numerous external (contextual) factors that influence the succession process, such as the state of the economy, purchasing offers received from potential buyers, market conditions, and financial pressure from investors (Morris et al. 1997). Many studies have focused on process factors. One group of literature on process factors examines how much succession depends on aspects such as the shared vision of predecessor and successor, the training and development of the successor, the selection process of the successor, and corporate governance (Dyck et al. 2002; Lansberg 1999; Sharma et al. 2001). Other process-focused studies suggest that decisions regarding the successor are achieved in a step-by-step process (Barach–Ganitsky 1995; Handler–Kram 1988; Lansberg 1999). Yet another category of literature studies the relationships within the family, between family members, and the external context of the family (relationship factors). The main identified problem sources are commutation issues, the level of trust, and family cohesion (Aronoff–Ward 1995; Chrisman et al. 2005; Kets de Vries 1993). Predecessors’ unwillingness to share power with family members, as well as successors’ grudges, constitute an important topic that is only marginally addressed in the literature and requires further investigation (Handler 1990; Keogh–Forbes 1991). In relation to this, shared family values including loyalty and devotedness (Handler 1990; Morris et al. 1997) and common agreement about vision and traditions have been studied (Davis–Harveston 1998; Dyer 1986; Le Breton-Miller et al. 2004; Nelton 1991).

All the research findings above are valuable but they regard the succession of the family business as a linear process that is in line with the strategic planning and specific goals of the predecessor, which (Sarasvathy 2001) calls a “causal” approach. The predecessors develop their family business in line with strategic and personal goals and implement planned activities to achieve them. From an economic perspective, however, these goals may not be rational, as other emotional and personal family factors influence business goalsetting.

Understanding aspirations and human decisions

Proponents of rationality in the economic sense argue that the majority of people should behave rationally, so that the economy as a whole can be described well using classical models, and that those who deviate from this perspective are unique, and their study belongs to the field of psychology or sociology. However, it can be seen that there are types of irrational features that occur at the system level. For example, a significant proportion of individuals make mistakes with estimating certain statistical phenomena (Kahneman 2011). “The focus and attention of economists have shifted from assuming the rational decision-making of individuals towards hypothesizing a limited role for rationality in decision-making. Previously, standard economic theories assumed that individuals made decisions rationally, but failed to explain the decisions that individuals make when, for instance, they make choices that are not in their best interest, or are sometimes even harmful to themselves” (Manasontorn 2020). For facilitating decision-making, decisions are deeply influenced by heuristics – a rapid sort of thinking that involves making sufficient but not optimal solutions to accelerate the decision-making process (Wansink–Chandon 2006; Haws et al. 2017).

Kahneman (2011) describes the thought process using the metaphor of two systems. “System 1” produces fast thinking. It makes quick judgments based on familiar patterns and works automatically and effortlessly. “Fast thinking includes both variants of intuitive thought – the expert and the heuristic – as well as the entirely automatic mental activities of perception and memory” (Kahneman 2011). “System 2” produces slow thinking, meaning it takes more dedicated focus and needs more attempts and methodical engagement. The interaction between the two systems is continuous but does not always run smoothly. To understand the succession decision-making process of the predecessor, the decision-maker’s thinking process and aspirations have to be taken into consideration. In accordance with Simon (1960), we understand the process of taking action about a decision as comprised of three principal phases: “finding an occasion to make a decision, exploring different courses of action and, finally, choosing from those courses of action.” In the study of the human thought process, the concepts of Econs and Humans emerged (Thaler–Ganser 2015). Homo Economicus (Econs) is rational, and economic models support the idea that every individual decision is constitutionally rational. From this perspective there is no differentiation between what we want and what we choose; choices simply reveal preferences. This is why for understanding behavior there is a need to study Humans rather than Econs. Due to the heterogeneous characteristics of succession decisions, including a lack of experience and the variety of aspirations, the Econ mindset does not

give us relevant insights regarding the future of family businesses. Therefore, in accordance with Thaler and Ganser (2015), I reflect on an important concept, self-control, which arises when preferences are inconsistent across time or context. Ariely and Jones (2008) suggests that almost everyone has problems with procrastination and self-control, but those who recognize and admit these weaknesses are more successful in overcoming them. Our view of consecutive events is affected by our expectations. The latter are an aspect of stereotypes, which can be considered a way of categorizing information. Our cognitive processes do not start afresh every time when faced with new scenarios, but instead they build upon previous experiences. Bruner (2020) argues that we organize our experiences and our memory of events mainly in the form of narratives, stories, and myths. Recently, the situation has reversed. Therefore, family business owners should be aware that even if they do not have narratives about succession, they are still exposed to narratives about it.

According to March (1978), the driving forces behind decisions are expectations, incentives and desires. The evaluation process starts with finding potential solutions, which is followed by the identification of consequences, and then one has to be able to choose those solutions which are liable to have consequences most congruent with one's desires. In the decision-making process, solutions and expectations are not known but have to be discovered or developed. This can lead to uncertainties and errors; decisions are claimed to be rational, yet are bounded by human limitations. Therefore, in response to experience, aspirations and search rules are adjusted over time (March 1991). Despite the important role of narratives in the development of thought processes, researchers have resisted studying them. Aspirations that inspire here-and-now decisions are determined by these narratives. The goal of the research was to bring to the surface the aspirations and intuitive knowledge (Kahneman 2011) of decision makers in order to deepen our understanding of succession decision-making phenomena.

METHODOLOGY

The concept of “aspiration” (March–Simon 1958) is well-known and accepted in the study of decision-making. However, for those outside of this field, “aspiration” may be a noun with a different meaning to those involved in the study of decision-making. The use of concepts from any other profession or discipline, or the use of a new concept, would equally make it hard for the reader. This short elucidation will perhaps help the reader to accept that the use

of concepts and frameworks from distinct disciplines limit the approach to the resolution of real problems. Therefore, as argued in the methodology section, to explore this thought-provoking problem space, I needed to step out from the disciplinary boundaries and adopt a transdisciplinary approach.

Adopting a transdisciplinary approach has been considered a way to address complex societal problems which cross disciplinary boundaries (Costanza ed. 1991; Horlick-Jones–Sime 2004; Pohl 2008; Popa et al. 2015; Polk 2015; Del Cerro Santamaría 2015; Guimarães et al. 2019). To understand the mindset of a predecessor during a succession decision we need to consider concepts like human decisions and social narratives. The concepts for the study come from sociology, behavioral economics, and cultural anthropology. Therefore, I share the view of how a transdisciplinary approach goes beyond the conceptions of scientific disciplines and involves trying to integrate and synthesize many different disciplinary perspectives. According to Jahn and colleagues (2012), the transdisciplinary approach should use simple language shared by disciplines and be understandable by society. “The capacity to transgress disciplinary or professional boundaries, by common understanding to ‘think out of the box’ is taken into account as a characteristic of transdisciplinary inquiry” (Lawrence 2015). Harmonized with the ontological axiom of Nicolescu (2014a; 2014b) that every predecessor’s succession decision is made on a personal level, I observe the mindset patterns on the personal level. In the study, I exclude both the organizational and the social levels.

Within the field of artificial intelligence, knowledge-based systems have been maturing for decades, with applications in several areas and fields of research (Wagner 2017). Knowledge representation techniques also range from rules to cognitive maps and frames (Gavrilova–Leshcheva 2015; Wagner 2017). Knowledge-based systems have two components: a framework or a shell, and the knowledge base. In pathfinding, they connect concepts (the expectations of the decision maker) with a few thousand ‘*if ... then*’ rules. The system then embodies the symbolic representation of knowledge, describing the practitioner’s knowledge with concepts that are connected by these *if ... then* rules. After the formulation of the aspects of the decision, the knowledge acquisition process can start in the knowledge-based system. First, one should collect the cases – meaning the appropriate alternatives and the expectations – i.e., the attributes associated with the alternatives. After data collection is complete, the knowledge-engineering process can start within the knowledge base. The tool that is used here is called the Doctus Knowledge-based Expert System (a description of the system and its operating logic can be found in papers by Stupar et al. 2013; Vlahovic 2007; 2008; Baracskaï et al. 2014; Velencei et al. 2014; Velencei 2017). Aspects of the decision or aspirations, as defined

by March (1991), are called attributes in the knowledge-based system. The attributes and their values are defined by the expert decision maker, which is why we can call an attribute a decision benchmark. Once the attributes and their values are defined, the outcome for each of the cases needs to be recorded. The knowledge-acquisition process for the knowledge base in this study consisted of building the survey, validating the survey, and coding responses. The aspirations and their levels were exposed through this process. To represent knowledge, the knowledge-based system uses symbolic logic in which knowledge is expressed by logical statements in the form of *if ... then* rules between attributes. During the collection of knowledge, a kind of argot is formed. The then-and-there valid interpretations of concepts are outlined.

The knowledge-based system used in the research is equipped with case-based reasoning (CBR) functionality, by which an entropy-gain method infers the *if ... then* rules. I chose case-based reasoning to identify which attributes have the greatest descriptive power. The easiest way to think of CBR is as a machine-learning system that extracts the rules from a set of cases by classifying them according to the values of an outcome attribute. The logic of the process is the following: We consider the set of cases to be disordered, and we define order as subsets of cases, each of which have the same value of outcome attribute (benchmark). The machine-learning process in case-based reasoning uses a modified ID3 algorithm based on assigning informativity to specific attributes based on how much they contribute to the order; the order here is represented by entropy and the contribution to order is the entropy gain (Velencei et al. 2019). In order to implement this logic, the following steps are taken (what follows is an in-principle description that disregards some technical details): First, we take an arbitrary attribute and group the cases according to the values of this attribute; then we examine how similar this grouping is to the grouping according to the values of the outcome attribute (benchmark); this similarity is the entropy gain of the examined attribute. We repeat the process for all the attributes, and then choose the one with the highest entropy gain; this is the most informative attribute for the given case set. We then form subsets of cases according to the values of the most informative attribute. Cases in some of the subsets may all have the same value as the outcome attribute (benchmark); these subsets are considered 'in order'; we leave them as they are for the moment. Instead, we focus on the subsets in which cases do not all have the same value as the benchmark; we repeat the whole previous process on these subsets, iteratively, until all subsets are ordered. The classification system is very sophisticated as the different subsets are formed according to the values of different attributes, while the artificial intelligence (AI) learns the rules connecting the values of

the informative attributes; these rules correspond to a simple explanation that describes all outcome values. The advantage of CBR is that the number of attributes is reduced, leaving only the most informative attributes. In the CBR process, several attributes can be considered benchmark attributes. The benchmark attributes are those that are evaluated based on the remaining attributes. From the results of CBR, the important aspects of the decision can be obtained by reduction by extracting the rules from the induction tree. Reductive Reasoning, which follows CBR, aims to describe the phenomenon at hand with the smallest number of attributes that can be evaluated according to the fitness function as defined by Tam and Cheung (2000).

Kahneman (2011) provided several pieces of evidence to support the claim that one cannot estimate the size of a population – consequently, a number estimated intuitively cannot be validated by a rational thinking process or reasoning. According to the latter's studies, these apparently analytical estimates are always biased (as they state, we think metaphorically); on the other hand, statistics require us to think about many things at the same time, which is not the way System 1 works. Our overconfidence is the bottleneck that hinders us from acknowledging our ignorance and the uncertainty of the world we live in. Therefore, in this study and everywhere else, the results of surveys should be handled with care and responsibility. The results of this study add to the literature by increasing understanding that the three stages of decision-making described by Simon (1997) are relevant and should be considered in the study of mindset patterns as people at different stages have different expectations and aspirations, and are influenced by different narratives. Based on the work of Dreyfus and colleagues (2000), the process of decision making is considered a process of thinking and reasoning. Cognitive psychology research has established that if we find an imperfect solution (not necessarily the best solution), we choose it and make a decision (Simon 1997).

MINDSET PATTERNS

To test the process of generational change in family businesses, a qualitative research approach was defined. As illustrated in Table 3, 26 attributes were collected for use in the knowledge base according to four main sub-topics: classification, succession planning, business planning, and wealth management. I must note that among the expectations that could be derived from financial data, no attributes are included. From the perspective of the analysis, it is important to note that all answers came from family business which are either beginning the

succession process or are already in the process or have finished it. The survey was validated with a six-member focus group. Table 3 summarizes the three or four values assigned to the attributes.

The original data collection was undertaken by targeted email sent to family businesses which created the basis for the study. A total of 141 responses were received as of January 2019. Given Hungary's historic background, the majority of the generation changes that have happened in the last five years are first ones. Kása and colleagues (2019) estimated the number of family businesses at between 28,276 and 34,502, with 95% confidence that this figure is accurate within the tested limits. According to the Hungarian Statistical Office, between the years of 2002 and 2013 there were 145,447 SMEs, 8,723 of which were not micro-businesses. I estimate that among those 8,723 enterprises, around 25% are still in business, which narrows the data pool to around 2,180 family businesses near or in the process of generational change. Considering the estimated size of the data pool and the response rate, the findings from the dataset are not generalizable. However, I have excellent data for an exploratory study, the outcome of which can serve as a starting point for understanding the phenomenon of succession and identifying tentative commonalities and differences in the mindset patterns of predecessors during the succession decision process.

In 2021 I repeated the data collection process among those attendees who in the original poll stated that generation change would occur within less than five years, and for whom the change process had not begun yet or had already begun at the time of the original study. The total number declined to 48 for those who estimated that the generational change process would occur in less than five years, while the application of the second criteria (generation change has not begun or is already in process) reduced the new data set to 30 cases.

I analyzed this reduced data set in terms of the original answers and the new dataset to find out how reasoning has changed over time. Based on the findings, I challenge the unitary construct assumptions adopted by the vast majority of studies on succession in the field of family businesses. In other words, I suggest that there is no single model that describes all generational changes. Instead, I suggest that we need different models to describe the succession phenomenon under different circumstances, as all the conditions are impossible to account for within a single model. By accepting that there is no comprehensive model, predecessors can focus on what decision aspects are worth considering according to their particular set of circumstances, instead of searching for a single comprehensive model. The impossibility of applying the single-model approach that this exploratory research highlights is limited to the scope of first generational change. Further research is needed to cover subsequent generational changes.

Table 3. Attributes in the knowledge base with their value

Name	Value 1	Value 2	Value 3	Value 4
Problems during generation change	definitely count on it once	rather count on it multiple times	rather not count on it have already begun	do not count on it at all did not begin yet
Generation change, number	young	middle-aged	old	
Running as a family business	thought about it	did not think about it	already a public company	
Purchase offer	received, was a thoughtful offer	received, but rejected	searched for an opportunity, but was unsuccessful	did not even begin to search
Adequate successor	already found one	probably found one	probably did not find one	did not find one
Current operation	satisfied with it	rather satisfied with it	rather not satisfied with it	not satisfied with it
Succession timeline	less than 5 years	6 to 20 years	more than 20 years	not planned at all
Preparation of successor	conscious preparation	rather conscious preparation	rather not conscious preparation.	not conscious preparation
Preparation of succession strategy	already exists	planning has started	planning did not start yet	do not plan on it at all
Including expert in succession planning	definitely must	rather necessary	rather not necessary	not necessary at all
Period of succession strategy	less than 1 year	1 to 5 years	6 to 10 years	more than 10 years
Content of succession	ownership and management	just management transfer	just ownership transfer	do not plan on succession at all
Period of financial planning	less than 1 year	1 to 5 years	6 to 10 years	more than 10 years
Including expert in financial planning	definitely must	rather necessary	rather not necessary	not necessary at all
Including competent employer in financial planning	definitely must	rather necessary	rather not necessary	not necessary at all
Historical data use in financial planning	absolutely	rather yes	rather no	not at all
Diversification in product portfolio	absolutely	rather yes	rather no	not at all
Effect of generation change on business plan	definitely count on it	rather count on it	rather not count on it	do not count on it at all
Regular investment/profit retained currently	absolutely	rather yes	rather no	not at all
Regular investment/profit retained in the future	absolutely	rather yes	rather no	not at all
Current value-added investment	absolutely	rather yes	rather no	not at all
Future value-added investment	absolutely	rather yes	rather no	not at all
Current assets cover long-term operation	absolutely	rather yes	rather no	not at all
Successor is capable of handling assets in the future	absolutely	rather yes	rather no	not at all
Future operation will require loans	absolutely	rather yes	rather no	not at all

source: author's elaboration

The mindset patterns presented here only represent what could be learned from the cases included in the knowledge base. The findings are therefore only valid within these boundaries. Adding new cases to the existing knowledge base through future research could reveal further rules. At present, however, the findings are not generalizable, but they create a basis for explaining the succession phenomenon. Further research could expand the approach of examining mindset patterns in terms of scope, venturing to study other countries, or investigating subsequent generational changes, etc., or in terms of time, could develop longitudinal studies.

The KBS learned from previous decisions by identifying relevant patterns. This is however not the end but the beginning of understanding succession, because, as Handy (2008) suggests, as we try to mentally process a phenomenon, knowing what is relevant, how to approach it, and what to do with it once we find it, is exceptionally important. It is important to understand that succession decisions are not simply a 'knowing process' but more of a complete cognitive process involving feelings, emotions, and values (Dörfler–Szendrey 2008). Furthermore, as Taleb (2007) suggests, although the human tendency to pursue certainty is natural, the former decisions are still more about intellectual passions.

As mentioned above, these values are used in abstract form, without quantification. In accordance with the knowledge acquisition method, I assume that predecessors are able to evaluate the generational change problems that arise based on thought patterns as cognitive schemas in their minds. So, all these aspects are the kind of "soft" information that can only be captured from the minds of predecessors and nowhere else.

To obtain the most informative attribute that has the greatest descriptive power, and therefore should be first examined, inductive reasoning was chosen. This happened through the application of the *if ... then* logical rules applied by the knowledge-based system. When the expert articulates the important aspects of their decision as well as the rules, the system triggers these rules to obtain the valuation. We refer to this as deduction or rule-based reasoning. This is useful when the decision maker has no experience in the field and the situation requires an original decision. KBS supports those decision makers who are experts in their decision domain. The KBS applied uses the ID3 algorithm that builds an increasingly complex decision tree (hypothesis) from the available data (Quinlan 1986). The tree is essentially a rule-based graph created via the formula of entropy.

If we sort the attributes according to informativity, we get the following figures:

Figure 1. *Informativity of attributes in the original data set (2018) and in the new dataset (2021)*

original data set (2018)			new data set (2021)		
Attribute	Informativity	Density	Attribute	Informativity	Density
regular investment/profit rewind in	0.1244	7.38	adequate successor	0.2202	7.74
running as a family business	0.1172	6.95	period of financial planning	0.1742	6.13
adequate successor	0.1161	6.88	including competent employer in f	0.1410	4.96
future value-added investments	0.1159	6.87	future value-added investments	0.1370	4.82
preparation of succession strateg	0.1159	6.87	current value-added investments	0.1325	4.66
successor is capable of handling	0.1138	6.75	running as a family business	0.1190	4.19
effect of generation change on bu:	0.1065	6.32	regular investment/profit rewind in	0.1082	3.81
future operation will require loans	0.1061	6.29	current assets cover long term op	0.0988	3.47
including competent employer in f	0.1056	6.26	successor is capable of handling	0.0932	3.28
preparation of successor	0.1048	6.21	content of succession	0.0867	3.05
period of succession strategy	0.0836	4.96	purchase offer	0.0827	2.91
regular investment/profit rewind cu	0.0825	4.89	running as a public company	0.0790	2.78
including expert in financial planni	0.0824	4.89	future operation will require loans	0.0773	2.72
current operation	0.0813	4.82	current operation	0.0752	2.65
including expert in succession pla	0.0719	4.26	historical data use in financial pla	0.0742	2.61
current assets cover long term op	0.0704	4.18	including expert in financial planni	0.0727	2.56
period of financial planning	0.0696	4.13	effect of generation change on bu:	0.0722	2.54
content of succession	0.0643	3.81	diversification in product portfolio	0.0551	1.94
historical data use in financial pla	0.0613	3.63	regular investment/profit rewind cu	0.0529	1.86
diversification in product portfolio	0.0558	3.31	preparation of succession strateg	0.0488	1.72
generation change #	0.0463	2.74	including expert in succession pla	0.0478	1.68
running as a public company	0.0455	2.70	period of succession strategy	0.0449	1.58
current value-added investments	0.0360	2.13	preparation of successor	0.0122	0.43
purchase offer	0.0325	1.93	generation change #	0.0102	0.36

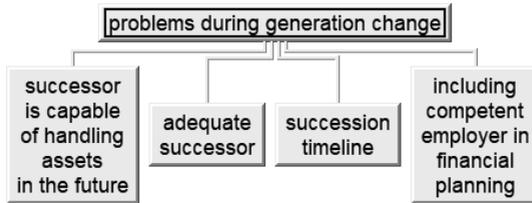
Source: Author's own elaboration.

We can see that the most informative attribute changed significantly from the regular investment/profit retained to the adequate successor.

During the original analysis we found that four attributes describe the problems that occur during generation change: Successor is capable of handling assets in the future; Adequate successor; Succession Timeline; Including competent employer in financial planning.

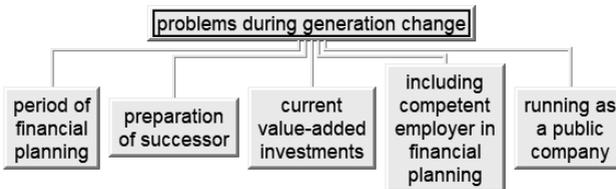
The reduced data set gave us a different perspective, as seen in Figure 3. The attributes of period of financial planning, preparation of successor, current value-added investments, including competent employer in financial planning, and running as a public company became descriptive.

Figure 2. Graph – original dataset



Source: Screenshot from Doctus.

Figure 3. Graph – reduced dataset



Source: Screenshot from Doctus.

Table 4. represents the *if ... then* rules in tabular form. The values of the attributes are read from left to right. An asterisk (*) means that the attribute influences the rule. First let us take a look at the rules from the original dataset:

Table 4. Rules (original dataset)

successor is cap	adequate successor	succession timeline	including competent employer	problems during generation change
absolutely	already found it	more than 20 years	*	definitely count on it
absolutely	did not find it	*	*	definitely count on it
absolutely	already found it	less than 5 years	*	definitely count on it
absolutely	already found it	6 to 20 years	*	definitely count on it
rather yes	*	*	rather necessary	definite / rather count on it
absolutely	probably found it	*	*	definite / rather count on it
rather yes	*	*	definitely must	definite / rather count on it
not at all	*	*	*	definite / rather cou / rather not cc / do no
rather yes	*	*	not necessary at all	defini / rathe / rather not count on it
rather no	*	*	*	de / rather count on it / rath / do not c
absolutely	already found it	not planned at all	*	rather count on it
rather yes	*	*	rather not necessary	rather count on it / rathe / do nc
absolutely	probably did not find it	*	*	rather not count on it

Source: Screenshot from Doctus.

Examples of *if...then* rules for problems during generation change from the top and the last case at the bottom from the Table 4:

if Successor is capable of handling the assets in the future “absolutely” and
the Adequate successor is “already found” and
the Succession timeline is more than 20 years
then Problems during generation change “definitely count on it”

if Successor is capable of handling the assets in the future “absolutely” and
the Adequate successor “probably did not find it”
then Problems during generation change “rather not count on it.”

Rules from the reduced dataset can be read as the following (see Table 5):

if Period of financial planning is “less than 1 year” and
the Preparation of the successor is “conscious preparation”
then Problems during generation change “definitely count on it”
if Period of financial planning is “1 to 5 years” and
if Current value-added investments is “absolutely”
then Problems during generation change “rather count on it.”

There may be different explanations for these results, but we can say that aspirations and search rules are adjusted over time in response to experience (March 1991). Machine learning can identify patterns but cannot judge the significance of the particular patterns or dig deeper to figure out what is behind the observed patterns. Furthermore, this approach to modelling mindset patterns is highly sensitive to the level of expertise of the predecessor. The diversity of the identified rules suggests that the first generational change does not happen according to a single model but rather that a variety of pathways are followed depending on the context.

The weakness of the Doctus knowledge-based system and overall machine learning is that such techniques are only capable of aiding decision makers with natural intelligence, meaning the tool can only detect the mindset patterns of those who have them. In order to avoid faulty judgements, which are inevitable based on the imperfections inherent in the mindset patterns included in the sample data and the statistical calculations that are applied, we need to control the termination condition of the machine-learning algorithm to improve its outcomes. We believe that the more examples we process for the given situation/problem scenario, the more accurate the case-based graph becomes, enabling more precise valuation of the target attribute, although real experience shows that there is a plateau at beyond 25 leaves.

Table 5. Rules (reduced dataset)

Attributes	Cases	Rule Based Graph	Rules of problems during ...	Case Based Graph
period of financial planning	preparation of successor	including competent employer in financial planning	running as a public company	problems during generation change
less than 1 year	conscious preparation	*	*	definitely count on it
6 to 10 years	conscious preparation	*	*	definitely count on it
1 to 5 years	rather yes	rather necessary	did not think about it	definitely count on it
1 to 5 years	not at all	rather necessary	did not think about it	definitely count on it
less than 1 year	rather conscious preparation	*	*	definitely rather count on it
6 to 10 years	rather conscious preparation	*	*	definitely rather count on it
1 to 5 years	absolutely	*	*	rather count on it
1 to 5 years	rather no	*	*	rather count on it
1 to 5 years	rather yes	definitely must	*	rather count on it
1 to 5 years	not at all	definitely must	*	rather count on it
1 to 5 years	not at all	rather not necessary, not necessary at all	*	rather count on it
1 to 5 years	rather yes	rather not necessary, not necessary at all	*	rather count on it
1 to 5 years	rather yes	rather necessary	thought about it	rather count
1 to 5 years	not at all	rather necessary	thought about it	rather count
1 to 5 years	not at all	rather necessary	is already a public company	rather count
1 to 5 years	rather yes	rather necessary	is already a public company	rather count

Source: Screenshot from Doctus.

DISCUSSION AND CONCLUDING REMARKS

The aim was to increase understanding of a phenomenon: succession decisions in family businesses, which, based on the survey, we attempted to order in terms of intuitive knowledge and aspirations. The goal of the research was to bring to the surface the aspirations and intuitive knowledge (Kahneman 2011) of decision makers and understand how they change over time in order to deepen our understanding of succession-related decision-making phenomena.

Kahneman (2011) provided several pieces of evidence to support the claim that one cannot estimate the size of the population; consequently, a number estimated intuitively cannot be validated by a rational thinking process or reasoning. According to the latter's studies, these apparently analytical estimates are always biased: as the author claims, we think metaphorically, while on the other hand statistics requires us to think about many things at the same time, which is not the way System 1 works. Our overconfidence is the bottleneck that prevents us from acknowledging our ignorance and the uncertainty of the world we live in. Therefore, the results of surveys generally, and this one, should be handled with care and responsibility.

The mindset patterns presented here help us to understand that aspirations and search rules are adjusted over time. *If...then* rules are not generalizable across all cases; they are only valid for the examined cases. The results should be validated within these boundaries. Adding new cases to the existing dataset through further research could reveal new rules. It is important to highlight that the reasoning in the mindset patterns was reduced to 4-5 attributes, which indicates that in these cases rules were defined. We do not seek to generalize but to search for explanations of phenomena which trigger thinking and/or action. For those interested in the phenomenon, research is suggested in the area of increasing knowledge about changes in mindset patterns on a personal level through longitudinal studies or, alternatively, into the phenomenon on a social and/or organizational level.

REFERENCES

- Ariely, D. – S. Jones (2008) *Predictably Irrational*. New York (US), Harper Audio.
- Aronoff, C. E. – J. L. Ward (1995) Family-owned businesses: A thing of the past or a model for the future? *Family Business Review*, Vol. 8, No. 2., pp. 121–130, DOI: <https://doi.org/10.1111/j.1741-6248.1995.00121.x>.
- Barach, J. A. – J. B. Ganitsky (1995) Successful succession in family business.

- Family Business Review*, Vol. 8, No. 2., pp. 131–155, DOI: <https://doi.org/10.1111/j.1741-6248.1995.00131.x>.
- Baracskaï, Z. – J. Velencei – V. Dörfler – J. Szendrey (2014) *The Tunnel of Doctus KBS: The Deeper You Get the Darker It Is*. In: Proceedings of the 2nd International OFEL Conference on Governance, Management and Entrepreneurship, 4-5th April, 2014, Dubrovnik, Croatia. pp. 397–407.
- Basco, R. – M. J. Pérez Rodríguez (2009) Studying the family enterprise holistically: Evidence for integrated family and business systems. *Family Business Review*, Vol. 22, No. 1., pp. 82–95, DOI: <http://dx.doi.org/10.1177/0894486508327824>.
- Birley, S. (2001) Owner-manager attitudes to family and business issues: A 16 country study. *Entrepreneurship Theory and Practice*, Vol. 26, No. 2., pp. 63–76. DOI: <https://doi.org/10.1177/104225870102600204>.
- Blumentritt, T. P. – A. D. Keyt – J. H. Astrachan (2007) Creating an environment for successful nonfamily CEOs: An exploratory study of good principals. *Family Business Review*, Vol. 20, No. 4., pp. 321–335, DOI: <https://doi.org/10.1111/j.1741-6248.2007.00102.x>.
- Bruner, J. (2020) *Actual Minds, Possible Worlds*. The Jerusalem-Harvard Lectures. Cambridge (US), Harvard University Press.
- Cabrera-Suárez, K. – P. De Saá-Pérez – D. García-Almeida (2001) The succession process from a resource-and knowledge-based view of the family firm. *Family Business Review*, Vol. 1, No. 1., pp. 37–48, DOI: <https://doi.org/10.1111/j.1741-6248.2001.00037.x>.
- Chittoor, R. – R. Das (2007) Professionalization of management and succession performance—A vital linkage. *Family Business Review*, Vol. 20, No. 1., pp. 65–79.
- Chrisman, J. J. – J. H. Chua – P. Sharma (2005) Trends and directions in the development of a strategic management theory of the family firm. *Entrepreneurship Theory and Practice*, Vol. 29, No. 5., pp. 555–575, DOI: <https://doi.org/10.1111/j.1540-6520.2005.00098.x>.
- Chua, J. H. – J. J. Chrisman – P. Sharma (1999) Defining the family business by behavior. *Entrepreneurship Theory and Practice*, Vol. 23, No. 4., pp. 19–39, DOI: <https://doi.org/10.1177/104225879902300402>.
- Corbetta, G. (1995) Patterns of development of family businesses in Italy. *Family Business Review*, Vol. 8, No. 4., pp. 255–265, DOI: <https://doi.org/10.1111/j.1741-6248.1995.00255.x>.
- Costanza, R. (ed. 1991) *Ecological Economics: The Science and Management of Sustainability*. New York (US), Columbia University Press.
- Davis, J. A. 2008 Toward a Typology of Family Business Systems. In: Tàpies, J. – J. L. Ward (eds.): *Family Values and Value Creation*. A Family Business

- Publication. London (UK), Palgrave Macmillan, pp. 127–154, DOI: https://doi.org/10.1057/9780230594227_7.
- Davis, P. S. – P. D. Harveston (1998) The influence of family on the family business succession process: A multi-generational perspective. *Entrepreneurship Theory and Practice*, Vol. 22, No. 3., pp. 31–53, DOI: <https://doi.org/10.1177/104225879802200302>
- Dekker, J. – N. Lybaert – T. Steijvers – R. Mercken (2010) Developing a new typology of family firms based on professionalization and formalization. <https://api.semanticscholar.org/CorpusID:155164348>
- Del Cerro Santamaría, G. 2015. Transdisciplinary technological futures: An ethnographic research dialogue between social scientists and engineers. *Technology in Society*, Vol. 40., pp. 53–63, DOI: <https://doi.org/10.1016/j.techsoc.2014.10.005>.
- De Massis, A. – J. H. Chua – J. J. Chrisman (2008) Factors preventing intra-family succession. *Family Business Review*, Vol. 21, No. 2., pp. 183–199, DOI: <https://doi.org/10.1111/j.1741-6248.2008.00118.x>
- Dörfler, V. – J. Szendrey (2008) *From Knowledge Management to Cognition Management: A Multi-Potential View of Cognition*. Paper presented at OLKC 2008: International Conference on Organizational Learning, Knowledge and Capabilities, Copenhagen, Denmark.
- Dreyfus, H. – S. E. Dreyfus – T. Athanasiou (2000) *Mind over Machine*. New York (US), Simon and Schuster.
- Dyck, B. – M. Mauws – F. A. Starke – G. A. Mischke (2002) Passing the baton: The importance of sequence, timing, technique and communication in executive succession. *Journal of Business Venturing*, Vol. 17, No. 2., pp. 143–162.
- Dyer, W. G. (1986) *Cultural Change in Family Firms: Anticipating and Managing Business and Family Transitions*. San Francisco (CA, US), Jossey-Bass Inc. Publications. DOI: <https://doi.org/10.2307/2392903>.
- Dyer, W. G. (1992) *The Entrepreneurial Experience: Confronting Career Dilemmas of the Start-up Executive*. The Jossey-Bass Management Series. San Francisco (CA, US), Jossey-Bass Inc. Publishers.
- Dyer, W. G. (2006) Examining the “family effect” on firm performance. *Family Business Review*, Vol. 19, No. 4., pp. 253–273, DOI: <https://doi.org/10.1111/j.1741-6248.2006.00074.x>.
- Gavrilova, T. A. – I. A. Leshcheva (2015) Ontology design and individual cognitive peculiarities: A pilot study. *Expert Systems with Applications*, Vol. 42, No. 8., pp. 3883–3892. DOI: <https://doi.org/10.1016/j.eswa.2015.01.008>.
- Gersick, K. E.– K. E. Gersick – J. A. Davis – M. McCollom Hampton – I. Lansberg (1997) *Generation to Generation: Life Cycles of the Family Business*. Boston (MA, US), Harvard Business School Press.

- Gomez-Mejia, L. R. – M. Nunez-Nickel – I. Gutierrez (2001) The role of family ties in agency contracts. *Academy of Management Journal*, Vol. 44, No. 1., pp. 81–95, DOI: <https://doi.org/10.2307/3069338>.
- Guimarães, M. H. – Ch. Pohl – O. Bina – M. Varanda (2019) Who is doing inter- and transdisciplinary research, and why? An empirical study of motivations, attitudes, skills, and behaviours. *Futures*, Vol. 112., 102441, DOI: <https://doi.org/10.1016/j.futures.2019.102441>.
- Habbershon, T. G. – M. L. Williams (1999) A resource-based framework for assessing the strategic advantages of family firms. *Family Business Review*, Vol. 12, No. 1., pp. 1–25, DOI: <https://doi.org/10.1111/j.1741-6248.1999.00001.x>.
- Handler, W. C. (1989) Methodological issues and considerations in studying family businesses. *Family Business Review*, Vol. 2, No. 3., pp. 257–276, DOI: <https://doi.org/10.1111/j.1741-6248.1989.00257.x>.
- Handler, W. C. (1990) Succession in family firms: A mutual role adjustment between entrepreneur and next-generation family members. *Entrepreneurship Theory and Practice*, Vol. 15, No. 1., pp. 37–52, DOI: <https://doi.org/10.1177/104225879001500105>.
- Handler, W. C. – K. E. Kram (1988) Succession in family firms: The problem of resistance. *Family Business Review*, Vol. 1, No. 4., pp. 361–381, DOI: <https://doi.org/10.1111/j.1741-6248.1988.00361.x>.
- Handy, C. (2008) *The Hungry Spirit: New Thinking for a New World*. Random House.
- Haws, K. L. – R. Walker Reczek – K. L. Sample (2017) Healthy diets make empty wallets: The healthy = expensive intuition. *Journal of Consumer Research*, Vol. 43, No. 6., pp. 992–1007, DOI: 10.1093/jcr/ucw078.
- Horlick-Jones, T. – J. Sime (2004) Living on the border: Knowledge, risk and transdisciplinarity. *Futures*, Vol. 36, No. 4., pp. 441–456, DOI: <http://dx.doi.org/10.1016/j.futures.2003.10.006>.
- Ibrahim, A. B. – K. Soufani – J. Lam (2001) A study of succession in a family firm. *Family Business Review*, Vol. 14, No. 3., pp. 245–258, DOI: <https://doi.org/10.1111/j.1741-6248.2001.00245.x>.
- Jahn, T. – M. Bergmann – F. Keil (2012) Transdisciplinarity: Between mainstreaming and marginalization. *Ecological Economics*, Vol. 79., pp. 1–10, DOI: <https://doi.org/10.1016/j.ecolecon.2012.04.017>.
- Kahneman, D. (2011) *Thinking, Fast and Slow*. New York (US), Macmillan.
- Kása, R. – L. Radácsi – J. Csákné Filep (2019) Családi vállalkozások definíciós operacionalizálása és hazai arányuk becslése a kkv-szektoron belül. [Operationalisation of family businesses and estimation of their importance within the SME sector in Hungary]. *Statisztikai Szemle*, Vol. 97, No. 2., pp. 146–174. DOI: <https://doi.org/10.20311/stat2019.1.hu0005>.

- Keogh, J. – C. Forbes (1991) Enduring generations of change. *Industrial Distribution*, Vol. 4, No. 1., pp. 28–34.
- Kets de Vries, M. F. R. (1993) The dynamics of family controlled firms: The good and the bad news. *Organizational Dynamics*, Vol. 21, No. 3., pp. 59–71, DOI: [https://doi.org/10.1016/0090-2616\(93\)90071-8](https://doi.org/10.1016/0090-2616(93)90071-8).
- Klein, S. B. (2000) Family businesses in Germany: Significance and structure. *Family Business Review*, Vol. 13, No. 3., pp. 157–182, DOI: <https://doi.org/10.1111/j.1741-6248.2000.00157.x>.
- Lansberg, I. (1999) *Succeeding Generations: Realizing the Dream of Families in Business*. Boston (MA, US), Harvard Business School Press.
- Lansberg, I. – J. H. Astrachan (1994) Influence of family relationships on succession planning and training: The importance of mediating factors. *Family Business Review*, Vol. 7, No. 1., pp. 39–59, DOI: <https://doi.org/10.1111/j.1741-6248.1994.00039.x>.
- Lawrence, R. J. (2015) Advances in transdisciplinarity: Epistemologies, methodologies and processes. *Futures*, Vol. 65, pp. 1–9, DOI: <https://doi.org/10.1016/j.futures.2014.11.007>.
- Le Breton-Miller, I. – D. Miller – L. P. Steier (2004) Toward an integrative model of effective FOB succession. *Entrepreneurship Theory and Practice*, Vol. 28, No. 4., pp. 305–328, DOI: <https://doi.org/10.1111/j.1540-6520.2004.00047.x>.
- Littunen, H. – K. Hyrsky (2000) The early entrepreneurial stage in finnish family and nonfamily firms. *Family Business Review*, Vol. 13, No. 1., pp. 41–53, DOI: <https://doi.org/10.1111/j.1741-6248.2000.00041.x>.
- Litz, R. A. (1995) The family business: Toward definitional clarity. *Family Business Review*, Vol. 8, No. 2., pp. 71–81, DOI: <https://doi.org/10.1111/j.1741-6248.1995.00071.x>.
- Lubatkin, M. H. – W. S. Schulze – Y. Ling – R. N. Dino (2005) The effects of parental altruism on the governance of family-managed firms. *Journal of Organizational Behavior*, Vol. 26, No. 3., pp. 313–330, DOI: 10.1002/job.307.
- Manasontorn, R. (2020) Behavioral interventions for choice decision: Convenience and visibility interventions versus taste preference. *Corvinus Journal of Sociology and Social Policy*, Vol. 11, No. 2., pp. 23–48, DOI: <https://doi.org/10.14267/CJSSP.2020.2.2>.
- March, J. G. (1978) Bounded rationality, ambiguity, and the engineering of choice. *The Bell Journal of Economics*, Vol. 9, No. 2., pp. 587–608, DOI: <https://doi.org/10.2307/3003600>.
- March, J. G. (1991) How decisions happen in organizations. *Human–Computer Interaction*, Vol. 6, No. 2., pp. 95–117, DOI: 10.1207/s15327051hci0602_1.
- March, J. G. – H. A. Simon (1958) *Organizations*. New York (US), Wiley.

- Melin, L. – M. Nordqvist (2007) The reflexive dynamics of institutionalization: The case of the family business. *Strategic Organization*, Vol. 5, No. 3., pp. 321–333, DOI: 10.1177/1476127007079959.
- Miller, D. – I. Le Breton-Miller (2006) Priorities, practices and strategies in successful and failing family businesses: An elaboration and test of the configuration perspective. *Strategic Organization*, Vol. 4, No. 4., pp. 379–407, DOI: <https://doi.org/10.1177/1476127006069575>.
- Miller, D. – I. Le Breton-Miller – R. H. Lester– A. A. Cannella Jr. (2007) Are family firms really superior performers? *Journal of Corporate Finance*, Vol. 13, No. 5., pp. 829–858, DOI: <https://doi.org/10.1016/j.jcorpfin.2007.03.004>.
- Morris, M. H. – R. O. Williams – J. A. Allen – R. A. Avila (1997) Correlates of success in family business transitions. *Journal of Business Venturing*, Vol. 12, No. 5., pp. 385–401, DOI: [https://doi.org/10.1016/S0883-9026\(97\)00010-4](https://doi.org/10.1016/S0883-9026(97)00010-4).
- Nelton, S. (1991) Ten keys to success in family business. *Nations Business*, Vol. 79, No. 1., pp. 44–45.
- Nicolescu, B. (2014a) Methodology of transdisciplinarity. *World Futures*, Vol. 70, No. 3–4., pp. 186–199, DOI: <https://doi.org/10.1080/02604027.2014.934631>.
- Nicolescu, B. (2014b) Multidisciplinarity, interdisciplinarity, indisciplinarity, and transdisciplinarity: Similarities and differences. *RCC Perspectives*, No. 2., pp. 19–26, <http://www.jstor.org/stable/26241230>.
- Pittino, D. – F. Visintin (2009) Innovation and strategic types of family SMEs: A test and extension of Miles and Snow's configurational model. *Journal of Enterprising Culture*, Vol. 17, No. 3., pp. 257–295, DOI: <https://doi.org/10.1142/S0218495809000382>.
- Pohl, C. (2008) From science to policy through transdisciplinary research. *Environmental Science & Policy*, Vol. 11, No. 1., pp. 46–53, DOI: [doi:10.1016/j.envsci.2007.06.001](https://doi.org/10.1016/j.envsci.2007.06.001).
- Polk, M. (2015) Transdisciplinary co-production: Designing and testing a transdisciplinary research framework for societal problem solving. *Futures*, Vol. 65., pp. 110–122, DOI: [10.1016/j.futures.2014.11.001](https://doi.org/10.1016/j.futures.2014.11.001).
- Popa, F. – M. Guillermin – T. Dedeurwaerdere (2015) A pragmatist approach to transdisciplinarity in sustainability research: From complex systems theory to reflexive science. *Futures*, Vol. 65., pp. 45–56, DOI: <https://doi.org/10.1016/j.futures.2014.02.002>.
- Poutziouris, Z. P. (2001) The views of family companies on venture capital: Empirical evidence from the UK small to medium-size enterprising economy. *Family Business Review*, Vol. 14, No. 3., pp. 277–291.
- Poza, E. J. – M. S. Dagherty (2013) *Family Business*. 4th Edition. London (UK), Cengage Learning.

- Quinlan, J. R. (1986) Induction of decision trees. *Machine Learning*, Vol. 1, No. 1., pp. 81–106. DOI: <https://doi.org/10.1023/A:1022643204877>
- Rogoff, E. G. – R. K. Z. Heck (2003) Evolving research in entrepreneurship and family business: Recognizing family as the oxygen that feeds the fire of entrepreneurship. *Journal of Business Venturing*, Vol. 18, No. 5., pp. 559–566, DOI: [10.1016/S0883-9026\(03\)00009-0](https://doi.org/10.1016/S0883-9026(03)00009-0).
- Sarasvathy, S. D. (2001) Effectual Reasoning in Entrepreneurial Decision Making: Existence and Bounds. *Academy of Management. Proceedings*, Vol. 2001, No. 1. DOI: <https://doi.org/10.5465/apbpps.2001.6133065>.
- Sharma, P. (2004) An overview of the field of family business studies: Current status and directions for the future. *Family Business Review*, Vol. 17, No. 1., pp. 1–36, DOI: <https://doi.org/10.1111/j.1741-6248.2004.00001.x>.
- Sharma, P. – J. J. Chrisman – A. L. Pablo – J. H. Chua (2001) Determinants of initial satisfaction with the succession process in family firms: A conceptual model. *Entrepreneurship Theory and Practice*, Vol. 25, No. 3., pp. 17–36, DOI: <https://doi.org/10.1177/104225870102500302>.
- Sharma, P. – M. Nordqvist (2008) A Classification Scheme for Family Firms: From Family Values to Effective Governance to Firm Performance. In: Tàpies, J. – J. L. Ward (eds.): *Family Values and Value Creation*. A Family Business Publication. London (UK), Palgrave Macmillan, pp. 71–101, https://doi.org/10.1057/9780230594227_5.
- Simon, H. A. (1960) *The New Science of Management Decision*. New York (US), Harper & Brothers. DOI: <https://psycnet.apa.org/doi/10.1037/13978-000>.
- Simon, H. A. (1997) *Models of Bounded Rationality: Vol.3: Empirically Grounded economic reason* (Vol. 3). MIT Press.
- Stupar, S. – A. Pilav-Velić – E. Šahić (2013) Expert system approach to the assessment of spiritual intelligence impact for decision-making performance. *Business Systems Research Journal*, Vol. 4, No. 2., pp. 68–78, DOI: <http://dx.doi.org/10.2478/bsrj-2013-0013>.
- Taleb, N. N. (2007) *The Black Swan: The Impact of the Highly Improbable*. Vol. 2. New York (US), Random House.
- Tam, S. M. – K. C. Cheung 2000. Genetic algorithm based defect identification system. *Expert Systems with Applications*, Vol. 18, No. 1., pp. 17–25, DOI: [https://doi.org/10.1016/S0957-4174\(99\)00046-9](https://doi.org/10.1016/S0957-4174(99)00046-9).
- Thaler, R. H. – L. J. Ganser (2015) *Misbehaving: The Making of Behavioral Economics*. New York (US), WW Norton.
- Velencei, J. (2017) *Modelling the Reality of Decision Making with the Doctus Knowledge-based System*. In: Proceedings of the 20th International Scientific Conference “Enterprise and Competitive Environment,” March 9–10th 2017, Brno, Czech Republic, pp. 865–871.

- Velencei, J. – V. Szoboszlai – Z. Baracskai (2014) Smart decisions: DoctuS chooses a CLO. *Managerial Challenges of the Contemporary Society*, Vol. 7, No. 2., pp. 152–157.
- Velencei, J. – Á. Szeghegyi – Z. Baracskai – B. Bókayné Andrásó (2019) Modeling the Intuitive Decision-Maker's Mindset. *Acta Polytechnica Hungarica*, Vol. 16, No. 3., pp. 227–40.
- Vlahovic, N. (2007) *Supporting Decision Making in IT Security – An Information-Driven Approach*. In: Proceedings of the 7th WSEAS International Conference on Applied Computer Science, november 21–23rd, 2007, Venice, Italy, pp. 294–299.
- Vlahovic, N. (2008) Discovering tacit knowledge in business decision making. *WSEAS Transactions on Business and Economics*, Vol. 5, No. 3., pp. 72–81.
- Wagner, W. P. (2017) Trends in expert system development: A longitudinal content analysis of over thirty years of expert system case studies. *Expert Systems with Applications: An International Journal*, Vol. 76, Issue C, pp. 85–96, DOI: <https://doi.org/10.1016/j.eswa.2017.01.028>.
- Walker, E. – A. Brown (2004) What success factors are important to small business owners? *International Small Business Journal*, Vol. 22, No. 6., pp. 577–594, DOI: <https://doi.org/10.1177/0266242604047411>.
- Wansink, B. – P. Chandon (2006) Can “low-fat” nutrition labels lead to obesity? *Journal of Marketing Research*, Vol. 43, No. 4., pp. 605–617, DOI: <https://doi.org/10.1509/jmkr.43.4.605>.
- Winter, M. – S. M. Danes – S. K. Koh – K. Fredericks – J. J. Paul (2004) Tracking family businesses and their owners over time: Panel attrition, manager departure and business demise. *Journal of Business Venturing*, Vol. 19, No. 4., pp. 535–559, DOI: [https://doi.org/10.1016/S0883-9026\(03\)00061-2](https://doi.org/10.1016/S0883-9026(03)00061-2).

