Incremental or radical development? A dynamic approach to organisational changes and growth of Hungarian ICT SMEs*

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Abstract

This paper explores the dynamics of organisational change by building on firm life-cycle theory. Extant research assumed that the development of firms follows a certain sequence of stages. Based on the life-cycle model, this study evaluates the speed and extent of changes in organisational characteristics and firm growth during the development of ICT SMEs in Hungary. Hypotheses are tested using multivariate statistical methods. Results show that stagnant firms are not significantly different from the ones undergoing incremental changes, but significant growth coincides with radical organisational changes. Our findings highlight that team-based decision making, complex organisational structures and sophisticated information systems coincide with firm growth.

Keywords: firm life-cycle, growth, SME, ICT sector, organisational change
JEL Codes: D22, L25, L86

1. Introduction

Firm growth has often been understood as a multidimensional phenomenon in extant research, encompassing the increase in size of a firm in terms of employee number, sales and assets (Delmar 2006). The exploration of the antecedents of firm growth traditionally falls within the domain of entrepreneurship (Davidsson/Wiklund 2013), whereby firm growth is mostly associated with business success (Kiviluoto 2013). While some researchers argue that the characteristics of entrepreneurs (e.g.: capabilities, risk taking, entrepreneurial orientation, innovativeness) (Acquaah 2012) and organisations (e.g.: structure, size, decision making, communication and information systems, business processes, stakeholders) (Choong 2014) affect firm growth, these relationships have rarely been studied from the perspective of a process in which the relevance of different antecedents may vary as firms transition across various stages.

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Thus, this study adopts a dynamic perspective and examines the influence of the change of organisational characteristics on firm growth. Thereby, an evolutionary approach to the theory of the firm (Hodgson 2003) is adopted by drawing from the firm life-cycle theory.

Firm life-cycle theory has been used to study how firm growth (Steffens/Fitzsimmons/Davidsson 2006) changes over the lifespan of a business. It stipulates that homogeneous life-cycle stages based on organisational characteristics can be identified, and firms progress between these stages over time (McMahon 2001; Hanks/Watson/Jansen/Chandler. 1993; Lester/Parnell/Carraher 2003; Harjoto/Jo 2009; Massey/Lewis/Warriner/Harris/Tweed/Cheyene/Cameron 2006; Salamonné (2006; 2008). Importantly, organisational characteristics tend to differ between the life-cycle stages of birth, growth, maturity and decline (Lippitt/Schmidt 1967; Greiner 1972; Kimberly 1979; Churchill/Lewis 1983; Quinn/Cameron 1983; Miller/Friesen 1984; Scott/Bruce 1987; Kazanjian/Drazin 1989, Hanks et al. 1993; Lester et al. 2003; Lynall/Golden/Hillman 2003; Massey et al. 2006). Organisations are believed to progress through these stages by typically undergoing incremental changes to their organisational characteristics (Phelps/Adams/Bessant 2007; Stubbart/Smalley 1999).

However, much less is known about the dynamics of transitions between the stages, both with regard to the pace of these changes, as well as their direction (O'Farrell/Hitchens 1988). Thus, more research is warranted on what Levie and Lichtenstein (2010: 337) refer to as "*when and where dynamic states change*". While research focusing on stages of firm development has referred to a broad range of organisations (Levie/Lichtenstein 2010), SME (small and medium sized enterprise) life-cycles display their peculiarities. Extant findings indicate that although SMEs generally progress through life-cycle stages sequentially (Quinn/Cameron 1983), they may sometimes take alternate development paths (Churchill/Lewis 1983; Scott/Bruce 1987; Kazanjian/Drazin (1989). Some SMEs stop growing and get stuck in a particular life-cycle stage (McMahon 2001; Lester et al. 2003; Massey et al. 2006; Perényi/Selvarajah/Muthaly 2011), which can be due to changing personal motivations of entrepreneurs (e.g. Bridge/O'Neill/Cromie 2003).

Meanwhile, others grow out of the SME size category (Salamonné 2006; 2008). On the other hand, some entrepreneurs may choose to exit if external factors change (Dawson/Henley 2012; Hechavarria/Reynolds 2009). These different scenarios found in SME life-cycle studies clearly differ from general organisational life-cycle mechanisms and models. Yet, their explanations have predominantly been rooted at the individual level (Bridge et al. 2003), leaving space for a more comprehensive study of organisational evolution.

Given the above, this paper sets out to investigate how organisational characteristics differ between SMEs undergoing different types of (incremental or radical)

changes as companies develop. In doing so, we determine the potential organisational drivers of firm growth in Hungarian SMEs. The results also expose the particular strategies of organisational development that align with accelerated firm growth. Therefore, the resulting practical conclusions can allow for formulating specific recommendations on how managers of SMEs can configure organisational change strategies to enhance firm performance.

We pursue our objectives in the empirical context of Hungarian based ICT SMEs for several reasons. Researchers have argued for theory testing on industry-specific samples (Armstrong/Shimizu 2007; Newbert 2007). In fact, in order to capture the evolution of SMEs at a variety of stages of the lifecycle, we chose to focus on Hungarian based ICT firms because these are globally known for their competitiveness (Lengyel 2012; Lopez-Garcia et al. 2014), and the ICT sector is an important part of the Hungarian economy (GKI 2009; Rohman 2013).[1] Thus, the Hungarian ICT sector provides a technology driven context in which high-growth SMEs are actually present in potentially large numbers, to conduct a context-specific empirical study.

The remainder of the paper is organised as follows. It continues with a review of literature, encompassing firm life-cycle theory and organisational change dynamics. Subsequently, hypotheses are formulated in relation to incremental and radical organisational changes. After the description of the research design and the presentation of findings of the quantitative study, the paper concludes with a discussion reflecting on the research question and provides conceptual and practical recommendations.

2. Theoretical Framework and Hypotheses Development

2.1. Firm life-cycle theory

Organisational researchers have proposed various models to explain firm life-cycles. Most life-cycle models are characterised by varying challenges and opportunities for the firm, across different stages of its life-cycle (Lynall et al. 2003). The majority of papers discussing organisational life-cycle describes four or five stages (see Table 1).

Models with four or less stages are more applicable to SMEs, indicating the difficulty of identifying a decline stage in SMEs (Lippitt/Schmidt 1967; Smith/Mitchell/Summer 1985; Kazanjian/Drazin 1989; Kimberly 1979; Lyden 1975; Quinn/Cameron 1983; Steinmetz 1969). Models with more than five stages are rare, and predominantly appear in conceptual papers, suggesting that they are difficult to validate empirically (Greiner 1972; Hanks et al. 1993; Miller/Friesen 1984; Penrose 1952; Scott/Bruce 1987; Churchill/Lewis 1983; Adizes 1979).

1 Specifically, the ICT sector provided 4.1 % of the GDP (Eurostat 2019) and 4.6 % of employment (STADAT 2019) in Hungary in 2016.

For instance, research on the life-cycle of Hungarian SMEs (Salamonné 2006; 2008) has followed the five-stage framework drafted by Greiner (1972), with the caveat of eliminating the final stage of firm development finding it impossible to observe.

Table 1: Selected life-cycle models in extant literature

Number of stages	*Authors*
3	Lippitt/Schmidt (1967), Smith/Mitchell/Summer (1985)
4	Kazanjian/Drazin (1989), Kimberly (1979), Lyden (1975), Quinn/Cameron (1983), Steinmetz (1969)
5	Greiner (1972), Hanks et al. (1993), Miller/Friesen (1984), Penrose (1952), Scott/Bruce (1987)
6	Churchill/Lewis (1983)
10	Adizes (1979)

Sources: Levie/Lichtenstein (2010) and Perényi/Selvarajah/Muthaly (2011)

The model of Greiner (1972) was empirically investigated by Miller/Friesen (1984) and later confirmed by Lester et al. (2003) using quantitative methods.

Lester et al. (2003) define the five-stage model consisting of existence, survival, success, renewal, and decline. Table 2 provides details of organisational characteristics of SMEs in these life-cycle stages. The existence stage is also characterised by firm age (young companies), survival and renewal by high growth, success by low growth and decline by lack of growth.

The model of Lester et al. (2003) suggests that firms start small and relatively similar to each other. In order to expand, they go through organisational changes to meet the challenges of their environments. These changes involve formalisation of their systems and procedures. The selection process allows the organisations creating certain formal efficiencies to thrive and grow, while becoming more formal and structured in their internal operations. Information dissemination and processing becomes an essential part of a successful firm's internal capabilities. This way of operating in a changing and dynamic market environment, however, is rarely sustainable, and organisations developing further will enter the renewal stage, in which the organisation diversifies functions, structure and decision-making processes further, to suit the challenges they are facing. And if this renewal does not lead to a successful transformation, organisations enter decline, lose the sophisticated capabilities they had developed and thus

their market share, employment and competitive position in general are gradually reduced, until their operation is no longer economically sustainable.[2]

Table 2: SME Life-cycle stage characteristics

	Situation	*Structure*	*Decision-making style*
Existence (start-up)	■ Small ■ Young ■ Homogenous	■ Informal ■ Simple ■ Owner-dominated	■ Centralised ■ Trial and Error
Survival (expansion, early growth)	■ Medium-sized ■ Environment more competitive	■ Functional ■ Some formality	■ Some delegation ■ Begin formal information processing
Success (maturity)	■ Heterogeneous environment ■ Larger	■ Formal ■ Bureaucratic ■ Functional	■ Reliance on internal information processing
Renewal (diversification, stability)	■ Very heterogeneous environment ■ Large	■ Divisional ■ Some matrix	■ Sophisticated controls ■ Formal analysis in Decision Making
Decline (death)	■ Homogeneous and competitive environment	■ Formal ■ Bureaucratic ■ Mostly functional	■ Moderate Centralisation ■ Less sophisticated information processing

Sources: Greiner (1972); Hanks et al. (1993); Lester et al. (2003)

2.2. Dynamics of organisational change

Van de Ven/Sun (2011) define organisational change as an 'ongoing' and 'never ending' process. Our study sets out from the perspective of different dynamics of change, articulated by Greiner (1972) who contextualised the phenomenon of organisational change in the firm life-cycle theory. Greiner (1972) argued for two types of changes organisations undergo: evolutionary and revolutionary, based on the intensity of change. They described evolutionary changes as "*periods of growth where no major upheaval occurs in organization practices*" (p. 38), and revolutionary changes as "*periods of substantial turmoil in organization life*" (p. 38). The intensity of organisational change becomes measurable by the time elapsed between stages of development (Dawson 2014), and the speed of transformation defined as the magnitude of change over time (Langley/Smallman/Tsoukas/Van de Ven 2013).

2 This is one of the several views of organisational life-cycles, selected for this research study. A detailed review of further firm life-cycle theory related research is provided by Levie/Lichtenstein (2010).

Types of organisational change based on the nature of the change process include teleology (planned change), life cycle (regulated change), dialectic (conflictive change) and evolution (competitive change) (Van de Ven/Sun 2011). Planned change requires consensus within organisations. Dialectical processes – on the contrary – are built on conflicts existing between alternatives. Evolutionary changes, in turn, are characterised by cycles of variation, selection and retention. These change models of Van de Ven/Sun (2011) align with the conceptualisation of Greiner (1972) regarding the intensity of changes – based on the above definitions – in that evolutionary changes can either be planned, regulated or competitive, while revolutionary changes are expected more likely to be conflictive.

Organisational changes have been associated with drivers of firm performance. Churchill/Lewis (1983) applied the life-cycle based approach of Greiner (1972) to analyse SME growth and identified that personal and organisational factors drive firm growth in different life-cycle stages of development. Scott/Bruce (1987) extended these findings, by focusing on how companies develop from one life-cycle stage to the next, handling the 'crisis' of change. On the other hand, Kazanjian/Drazin (1989) concentrated on investigating the change itself, examining the transition between life-cycle stages, and found that different problems characterise different transitions.

Lynall et al. (2003) confirm that various life-cycle models are characterised by varying challenges and opportunities across different stages. Lester/Parnell/Carraher (2003) argue that understanding these challenges can lead to better firm performance (including growth). Decker/Durand/Mayfield/McCormack/Skinner/Perdue (2012) further demonstrate that the magnitude of change and the success or failure of the change process determine whether the organisation will be successful at pursuing a gradual (incremental) or a radical change.

Salamonné (2006; 2008) classifies Hungarian firms into life-cycle stages based on their size, age and a self-evaluation of business owners and managers, specifically focussing on the types of problems or 'crises' experienced. These crises – corresponding to the organisation development model of Greiner (1972) – trigger change in the organisation, advancing its development along the life-cycle. The challenges that trigger change are grouped into four major categories, in terms of what inputs or actions their resolution requires: creativity, control, delegation and coordination. These inputs or actions characterise the consecutive stages of firm life-cycle (Salamonné 2006; 2008). These organisational change dynamics, however, reach beyond the scope of firm life-cycle studies, predominantly occupied by investigating the nature, directionality and sequentially of life-cycle stages (O'Farrell/Hitchens 1988; Levie/Lichtenstein 2010).

These arguments provide a basis for the research question addressed in this paper, which is how much change is really necessary in order to result in signifi-

cant improvement of organisational performance. Furthermore, it is crucial to pose the question whether radical changes are indeed required to drive SME performance, or is this achievable by incremental (planned, evolutionary and regulated) changes. This question is furthermore pertinent, as it is symptomatic within the business environments of post-transitional countries such as Hungary, which are known for poor predictability and sometimes unsupportive environments for entrepreneurs (Ivy et al. 2014; Smallbone/Welter 2009; 2012).

2.3. Hypothesis development

In the context of life-cycle theory, the expectation is for firms to evolve between life-cycle stages sequentially over time. Radical change can be defined as change out of the ordinary. If incremental progression is the expected scenario of firm development, the lack of progression or progression in a reverse direction are both unusual change outcomes. Table 3 shows the various types of possible life-cycle stage changes over time. Stagnation means that a firm has not shifted substantially in the organisational life-cycle typology, hence suggesting a lack of change or very slow change.

Table 3: Classification of life-cycle stage changes

ΔT to evolve		Future T_1		
		Stage N-1	Stage N	Stage N+1
Past T_0	Stage N-1	Stagnation	Progression	Jump
	Stage N	Regression	Stagnation	Progression
	Stage N+1	Collapse	Regression	Stagnation

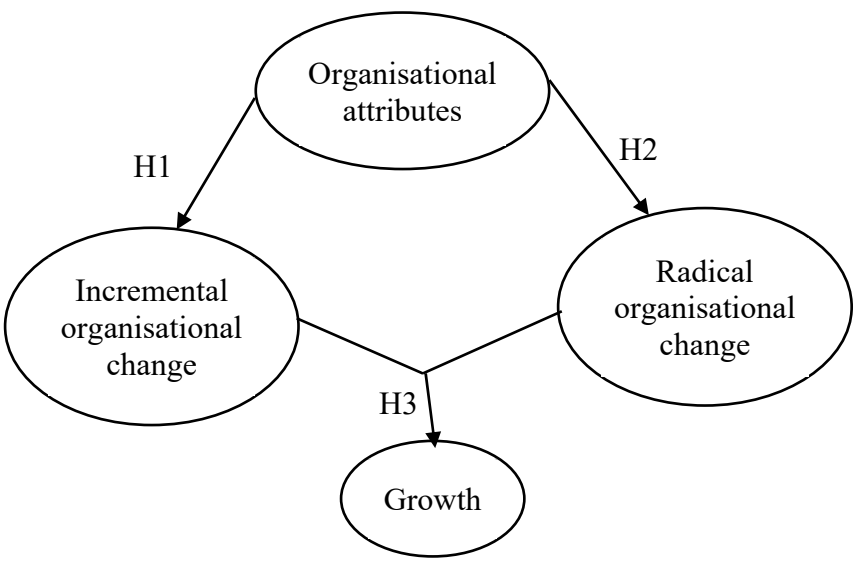
Regression indicates that the observed firm has – over time – moved into a life-cycle stage that it is expected to have passed through earlier, hence demonstrating a reverse direction of development. Whilst change in the life-cycle model is expected to be moving forward as assumed by the majority of existing research, gradual regression can also be considered as a type of incremental change. A special scenario of regression is labelled ‘Collapse’, which is beyond the scope of regular change, however.

Progression, on the other hand, means that the firm has moved one step forward in the life-cycle in the time period examined. This can indicate, depending on the length of time period, a regular and successful, incremental change process. A special case of progression is the ‘Jump’ scenario, in which a firm passes more than one life-cycle stage over the examined time frame. This can also indicate a radical change pattern, if the time frame examined is expected to be long enough for incremental change. On the whole, it can be concluded that incremental changes in an organisation’s life-cycle over time are considered evolu-

tionary, while changes shifting more than one life-cycle stage (multi-stage) can be referred to as radical.

Therefore, a vital managerial question pertains to the organisational characteristics defining the organisational life-cycles (as described in Table 2 and Table 5), which are subject to change over the progress of the life-cycle. On the one hand, organisational characteristics are indicative of a particular change in a firm's life-cycle. On the other hand, these organisational characteristics can be an outcome of earlier paths taken by a given organisation. Based on our literature review, and the aforementioned definition of incremental (evolutionary) and radical (revolutionary) change processes, it can be expected that these different development paths are characterised by different organisational attributes, and lead to different growth outcomes. The hypothesised relationships are shown in Figure 1.

Figure 1: The relationships between organisational attributes, change and growth



Our first hypothesis addresses the difference between stagnant organisations and organisations undergoing incremental changes. Incremental development is characterised by uninterrupted periods of continuous growth lasting from four to eight years (Greiner 1972). In this time period, relatively modest changes are experienced in the organisation. This corresponds to the observations of Salamonné (2006; 2008) who found that Hungarian firms either (1) do not tackle the challenges at hand and hence do not develop further, (2) solve the crisis (of creativity, control, delegation and coordination) at hand progressively, one at a

time; or (3) solve multiple crises with one adjustment. This leads to the first hypothesis of the study:

Hypothesis 1: As compared to stagnant organisations, organisations undergoing incremental changes over time do not display significantly different organisational attributes (organisational attributes as described in Table 2 and Table 5).

Our second hypothesis addresses the difference uniqueness of organisations undergoing radical changes. Specific organisational characteristics are associated with the ability of overcoming organisational crises in firms by means of revolutionary change (Greiner 1972). Kiss/Poór (2006) exploring the reasons of organisational change identify several typical organisation responses in Hungarian SMEs to the crises experienced through their development. These responses aim at fostering competitiveness and include organisational development and re-organisation. This leads us to the formulation of the following hypothesis:

Hypothesis 2: As compared to stagnant organisations, organisations undergoing radical changes display significantly different organisational attributes (organisational attributes as described in Table 2 and table 5).

Our third hypothesis extends the phenomenon of radical changes to rapid growth experienced by these firms. As indicated above, radical changes in organisational characteristics differ from incremental changes in that organisations jump forward (or backward) more than one step in the examined time frame (see Table 3). Greiner (1972) suggests that such changes are exhibited at times of rapid growth and imply the necessity of a radical change in organisational practices. Exploring the specific organisational characteristics further, Takács-György (2014) found for Hungarian SMEs that strategic orientation and planning, which enable firms to progress along their life-cycles, are key contributors to organisational growth. Hence, we posit that:

Hypothesis 3: As compared to stagnant organisations, organisations undergoing radical changes, display significantly higher growth.

A five-stage firm life-cycle model is the basis of testing organisational development characteristics in this paper, in order to explore the above hypotheses focusing on the second, third and fourth stages of development. Formulating hypotheses regarding the decline stage characteristics of organisations – especially SMEs – is particularly difficult in a quantitative context, because of the lack of possibility to capture organisations that are approaching exit. This has been reflected in several empirical studies of SMEs (such as McMahon 2001; Perényi et al. 2011; Salamonné 2006; 2008; Massey et al. 2006). Firm life-cycle theory posits a linear progression from one life-cycle stage to another (Lester et al.

2003; Massey et al. 2006; McMahon 2001). Hence, moving back into the initial stage of the life-cycle is not expected. Therefore, hypotheses in relation to the first (birth/existence) stage of the life-cycle are not considered for the purpose of this research, either.

3. Research Methods

Data collection was carried out among Hungarian ICT SMEs in 2009. As signalled at the outset, conducting the investigation in Hungary is justified by the necessity of context-specific theory development (Zahra 2007; Welter 2011). Particularly, Hungary representing a post-transitional economic environment, it is of particular interest to entrepreneurial business development (Dittrich/Schrader/Stojanov 2008; Ivy et al. 2014; Smallbone/Welter 2009; 2012). The selection of the ICT sector in Hungary can be justified with two key arguments. Industry-specific organisational development studies are empirically more successful (Westhead/Birley 1995; Armstrong & Shimizu 2007; Newbert 2007), and firm behaviour is frequently tested in individual countries and specific industries (Bartelsman/Haltiwanger/Scarpetta 2004). The focus on the ICT sector was considered pertinent in the Hungarian context because of the afore mentioned possibility to examine SME growth (GKI 2009; Rohman 2013; Lopez-Garcia et al. 2014). In particular, the research benefited from the existing body of firm life-cycle related empirical research in Hungary (Salamonné 2006; 2008; Kiss/Poór 2006; Takács-György 2014).

3.1. Data collection

A quantitative approach to the empirical investigation is warranted by the mature conceptual area of firm life-cycle theory (Edmondson/McManus 2007; Levie/Lichtenstein 2010). A mail-based survey was used to collect data from Hungarian ICT SMEs in 2009. The survey was posted to 1,870 companies selected from the comprehensive list of the Hungarian Central Statistical Office and other on-line databases. An overall response rate of 7.49 % has been achieved, which is within the parameters suggested by the experts of GKI Economic Research Company for mail-based company surveys in Hungary. Data cleaning reduced the number of usable responses to 131.

The oldest firm in the sample was established in 1982, the youngest in 2007. Table 4 contains detailed characteristics of respondents.

Table 4: Respondent characteristics

	Number of responses	Median	Max.*
Employee number	131	1–9 employees	250+ employees
Annual sales	130	€ 0–2 million	€ 10–50 million
Total assets	126	€ 2–10 million	€ 10–43 million

Type of activity	% of respondents **
Manufacturing and maintenance	19.1 %
Services	84.3 %
Retail and wholesale	14.6 %

* Based on the EU SME definition; ** Respondents were allowed multiple choices

Although the study conceptually builds on the area of SMEs, a high proportion of the responding firms were very small (potentially considered micro-enterprises), according to official (KSH 2009) and scholarly (Román 2009) sources. This distribution is representative of the population of Hungarian SMEs.

3.2. Measurement design

The scales used to measure organisational characteristics and identify life-cycle stages were developed by Hanks et al. (1993), based on the conceptualisation of Greiner (1979), and were subsequently refined and validated by Lester et al. (2003). The scales measuring organisational characteristics of specific life-cycle stages are related to the resolution of the primary challenges typically faced by the organisations in the particular stages. The original 20 questions of Lester et al. (2003) were modified, splitting a double-barrelled one into two sub-questions (SC1S and SC5S), resulting in a 21-question list displayed in Table 5 along firm life-cycle stage characteristics. The survey requested respondents to assess their organisation as it is currently (at the time of data collection) and four years before and provide their responses on a Likert type scale of 'strongly disagree' to 'strongly agree' scored 1 to 5.

The four-year time frame was determined based on the evaluation of life-cycle transition time periods of prior studies (Hanks et al. 1993; Lester et al. 2003; Massey et al. 2006; McMahon 2001; Salamonné 2006; 2008; Rohman 2013). The four-year time-frame was also selected because it was considered short enough not to invoke too much retrospective bias (Golden 1997).

Firm growth information was also collected in a similar Likert-type scale response format. Firm growth is a multidimensional phenomenon (Davidsson/Wiklund 2013; Penrose 1995; Storey 1982), represented as a change of firm size over time. Some of the most frequently used measures of firm size include employee number, sales (Coviello/Jones 2004) and asset size (Lee/Chu 2013). Therefore, firm growth was measured as sales, employment (full time equivalent numbers) and assets growth.

Table 5: Firm life-cycle scale

	Indicator label	Indicator description
Existence	EX1S	Organisation size (small)
	EX2PS	Power with founder
	EX3COS	Simple organisational structure
	EX4IS	Simple, word-of-mouth information systems
Survival	SR1PS	Power widely spread
	SR2IS	Information systems monitor and facilitate
	SR3DM	Decisions made by small group
	SR4COS	Specialised organisational roles
Success	SC1S	Organisation size (larger than competitors)
	SC2COS	Functional, formal structure
	SC3PS	Power with many shareholders
	SC4IS	Sophisticated information systems for profit making
	SC5S	Organisation size (not as large as potentially)
Renewal	RE1S	Widely dispersed organisation
	RE2COS	Sophisticated organisational structure
	RE3DM	Team orientated decision making
	RE4IS	Complex information system (coordination, servicing)
Decline	DE1DM	Centralised and simple decision making
	DE2COS	Centralised organisational structure
	DE3DM	Centralised, political decision making
	DE4IS	Simple but badly needed information systems

Source: Lester et al. (2003)

Table 6: Firm size measures

Indicator label	Indicator description	Values
Ftsize	Sales value	1: 0; 2: 0 – €2M; 3: €2M – €5M; 4: €5M – €10M; 5: €10M – €50M; 6: €50M +
Fasize	Assets size	1: 0; 2: 0 – €2M; 3: €2M – €5M; 4: €5M – €10M; 5: €10M – €43M; 6: €43M +
Fesize	FTE employment size	1: 0; 2: 1–9; 3: 10–19; 4: 20–49; 5: 50–249; 6: 250+

Firm size was collected as categorical information in the same three dimensions (sales, employment and assets), corresponding to theory as well as the EU definition of what constitutes an SME (EC 2008). Table 6 provides details of firm size measures.

3.3. Data Analysis

Data analysis was conducted using multivariate statistical methods. The scales were confirmed using Partial Least Squares (PLS) based modelling. This method was selected to address the relatively low sample size (N=131) and high number of scale items (21 firm life-cycle scale items) used and was able to overcome violations of the assumptions of covariance based multivariate statistical methods (Henseler et al. 2014). The guidelines of Esposito Vinzi/Trinchera/Amato (2010) were implemented for evaluating the scales in the SmartPLS 3.0 software environment (Ringle/Wende/Becker 2015). The grouping of the observations into life-cycle stages was done using cluster analysis, and t-tests were employed for the statistical comparison of the organisational characteristics, conducted in IBM SPSS version 23.

3.3.1. Scale validation

The confirmation of the scales was conducted using the PLS method. As data on firm life-cycle related organisational characteristics was collected as 'current' and 'past', the scales were validated for both instances in the data set.

Table 7: Current firm life-cycle scale validity and reliability

	Factor loadings*			
Explanation	Existence	Survival	Success	Renewal
Organisation size (small)	**-0.672**		-0.319	
Simple organisational structure	**-0.689**		-0.324	
Simple, word-of-mouth information systems	**-0.717**		-0.349	
Power widely spread		**0.616**		
Information systems monitor and facilitate		**0.769**	0.342	
Decisions made by small group		**0.755**		
Organisation size (larger than competitors)	-0.487		**0.587**	
Functional, formal structure		0.323	**0.651**	
Sophisticated information systems for profit making			**0.736**	0.538
Sophisticated organisational structure				**0.702**
Team orientated decision making				**0.736**
Complex information system (coordination, servicing)		0.437	0.515	**0.733**
Composite Reliability	0.74	0.76	0.70	0.77
AVE	0.48	0.51	0.44	0.52

* Cross-loadings below 0.3 are suppressed.

Criteria for acceptable measures included loadings of at least 0.5, preferably 0.7 for every indicator, resulting in a minimum of 50 % average variance extracted (AVE) and a composite reliability (Dillon-Goldstein's Rho) of at least 0.7 (Esposito Vinzi et al. 2010).

Table 7 shows the confirmed structure of the 'current' firm life-cycle scale. Some cross-loadings are visible across the measures, but the primary loadings of the indicators are always the strongest loadings.

Table 8: Discriminant validity of the current firm life-cycle scale

	Existence	Survival	Success	Renewal
Existence	0.693*			
	-0.192	0.717*		
Success	-0.479	0.357	0.661*	
SurvivalRenewal	-0.333	0.424	0.506	0.724*

*Squared root of AVE

As shown in Table 8, discriminant validity of the four life-cycle stage constructs is demonstrated, as the squared root of AVE scores displayed in the diagonal of the matrix exceed the absolute value of the correlations between the factors (Fornell/Larcker 1981). The statistical significance of all loadings further attests to the validity of the scale.

Table 9: Firm growth scale validity and reliability

	Factor loadings*		
Explanation	Asset growth	FTE growth	Sales growth
Slow asset growth**	**0.811**	0.353	0.630
Asset growth faster than competition	**0.797**	0.409	0.619
Very fast asset growth	**0.774**	0.354	0.609
Slow employment growth**	0.303	**0.734**	
Employment growth faster than competition	0.483	**0.890**	0.540
Very fast employment growth	0.333	**0.844**	0.370
Slow sales growth**	0.616	0.401	**0.808**
Sales growth faster than competition	0.634	0.386	**0.817**
Very fast sales growth	0.665	0.447	**0.832**
Composite Reliability	0.84	0.86	0.86
AVE	0.63	0.68	0.67

* Cross-loadings below 0.3 are suppressed.
** Items reversed due to the negative wording of the statement

Similar results are obtained from the evaluation of the 'past' measures of firm life-cycle regarding convergent and discriminant validity and reliability of the scales.

Similar to the firm life-cycle scales, the firm growth scale is also validated using PLS. After the removal of items with loadings below 0.5, substantial cross-loadings particularly between sales and asset growth indicate high correlation between the scales (see Table 9). Discriminant validity is confirmed in Table 10. All loadings in the scales are significant ($p<0.01$).

Table 10: Discriminant validity of the firm growth scale

	Sales	FTE	Asset
Sales growth	0.819*		
FTE employment growth	0.503	0.825*	
Asset growth	0.780	0.469	0.794*

*Squared root of AVE

Scale scores are calculated as weighted averages of indicator scores, using the factor loadings as weights. This allows for taking into consideration the relative importance of each indicator in further calculations (Hair/Black/Babin/Anderson/Tath 2006). For example, in Table 7, factor loadings of the three indicators on the Survival scale were 0.616 (SR1PS: Power widely spread), 0.769 (SR2IS: Information systems monitor and facilitate) and 0.755 (SR3DM: Decisions made by small group). A respondent indicating scores of x, y and z respectively to these variables, would receive an aggregate scale score of (x*0.616+y*0.769+z*0.755)/(0.616+0.769+0.755). Calculating weighted average scale scores for every observation is the basis for cluster analysis.

3.3.2. Cluster analysis

Cluster analysis is performed in two stages, to group firms into life-cycle stages. The basis of cluster analysis are the life-cycle stage scores, namely Existence, Survival, Success and Renewal. Cluster analysis is performed based on both the current and the past data, to group our observations into current and past life-cycle stages.

Hierarchical (agglomerative) clustering is used to determine the number of clusters best representing differences in the sample, and centroid based (k-means) clustering is employed to determine cluster membership of observations (Hair et al. 2006). Lester et al. (2003) also used hierarchical clustering (Ward's method) to establish cluster memberships. The hierarchical cluster analysis using Ward's distance was separately implemented for both current and past firm life-cycle

scale scores suggested the presence of four clusters corresponding to the four life-cycle stages represented in the analysis.

Table 11: Current firm life-cycle characteristics

		Clusters			
		1	2	3	4
		Existence	Survival	Success	Renewal
Current life-cycle cluster centres	Existence	**3.86**	4.19	2.59	3.78
	Survival	1.46	**3.08**	3.23	3.48
	Success	2.04	2.01	**3.51**	2.61
	Renewal	1.62	1.25	3.05	**3.06**
Current life-cycle cluster size		27	15	46	43
Size [minimum; maximum] *	Assets	[1;2]	[1;2]	[2;5]	[2;4]
	FTE	[1;2]	[2;4]	[2;6]	[1;5]
	Sales	[1;2]	[1;2]	[2;5]	[2;4]
Growth (mean)	Assets	2.03	1.75	2.34	2.10
	FTE	1.67	1.81	2.53	2.16
	Sales	2.25	2.10	2.67	2.56

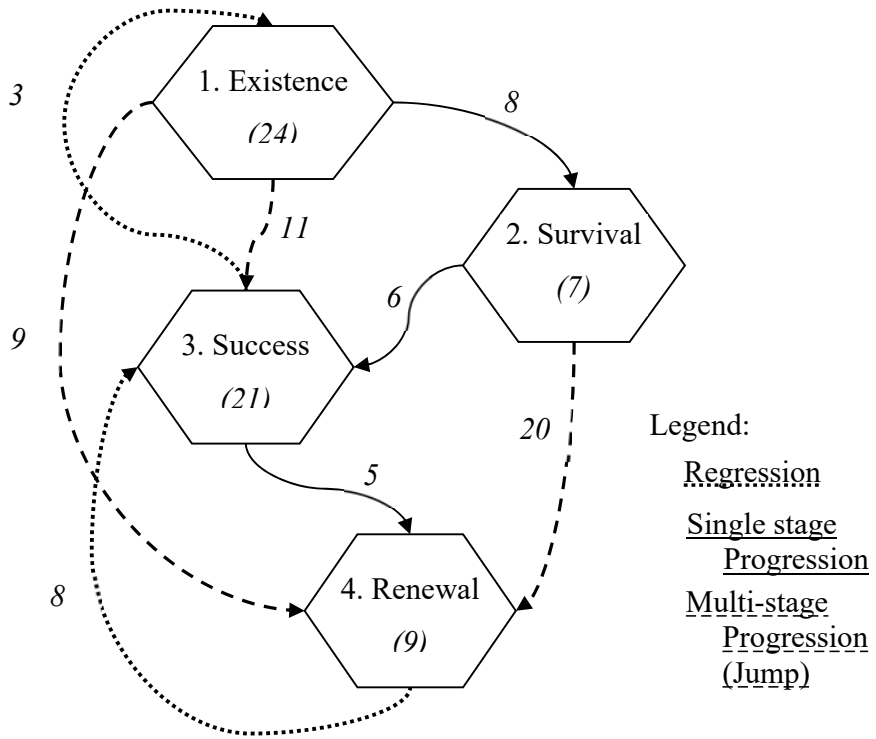
* Size categories as described in Table 6.

Table 11 provides details of the current firm life-cycle characteristics, showing cluster centres in all four dimensions, cluster sizes, firm size ranges within clusters and average firm growth indicators. The four clusters were progressively assigned to the particular life-cycle stages by assessing the stage specific indicator scores respectively. The first cluster displayed a high existence score but scored low on all other indicators, hence was labelled the existence stage. The second cluster displayed high existence and survival scores, but low success and renewal scores, hence was labelled the survival cluster. The third cluster displayed higher success scores with all other scores substantially lower and was labelled the success stage. The final, fourth cluster showed slightly higher renewal, and also high success scores, whilst displaying lower existence and survival scores, and was assigned the renewal stage. Firm size measures in all four areas show a progressive increase until the success stage, and a slight drop-off in the renewal stage. Firm growth measures are slightly higher in the existence stage with a dip in the survival stage, grow again in the success stage and slightly drop back again in the renewal stage. This corresponds to the expected characteristics of firms in particular life-cycle stages according to Table 2, hence further validating the assignment of clusters to life-cycle stages. Similarly, the firms were grouped using the past life-cycle indicators.

4. Findings

Having validated the scales and grouped the sample firms based on their characteristics pertaining to the life-cycle characteristics, the key step was the identification of transition trajectories of firms between life-cycle stages within the examined four-year time-frame. Figure 2 shows the transition diagram, identifying progression, stagnation and regression of firms. Out of the 131 observations, 61 (46.56 %) did not change their life-cycle stages, 59 (46.04 %) moved forward and 11 (8.4 %) moved backward in the life-cycle. Out of the 11 backward movements, 8 were from renewal to success (which is a realistic transition showing successful renewal) and three from renewal to existence. The other three observations were examined more closely, as they indicate failure of the renewal stage, and were omitted from the analysis. Out of the 59 firms moving forward in the life-cycle, a single stage progression was seen in 19, while 40 moved forward more than one stage.

Figure 2: Firm life-cycle transitions over time



With reference to the earlier discussion on incremental and radical changes, this provides a basis for identifying and evaluating the differences between stagnat-

ing and progressing firms. Incremental changes are identified as the single stage progressions in Figure 2, counting 19 observations. Radical changes are observed in firms moving forward more than one stage at a time, counting 40 observations. Further to this, the 8 observations in which firms went from the renewal stage to the success stage are also considered radical changes, as they have been able to reverse the expected path of development and succeed at it. In fact, a reverse development may be a sign of organisational learning and restructuring, which can lead to positive performance outcomes. Altogether 48 radical changes were counted.

Table 12: One-way ANOVA between current stagnation, evolution and revolution stage characteristics

			Stagnation		Incremental, Development		Radical Development		All	
	df = 127		N = 61		N = 19		N = 48		N = 128	
	F	Sig.	M	SD	M	SD	M	SD	M	SD
Existence	.109	.897	3.45	0.891	3.45	1.094	3.38	0.762	3.42	0.873
Survival	8.218	**.000**	2.64	1.135	2.94	0.695	3.40	0.828	2.97	1.026
Success	2.085	.129	2.66	0.883	2.55	0.855	2.94	0.783	2.75	0.850
Renewal	9.468	**.000**	2.34	1.028	2.20	1.055	3.03	0.686	2.58	0.979
Asset growth	.809	.447	2.11	0.688	2.03	0.713	2.23	0.550	2.14	0.642
FTE growth	.124	.883	2.15	0.974	2.07	1.133	2.20	1.024	2.16	1.010
Sales growth	1.549	.216	2.38	0.944	2.40	1.041	2.70	1.023	2.50	0.993

Table 12 displays the one-way ANOVA test results for comparing life-cycle characteristics and growth of the stagnation, the incremental, evolutionary and the multi-stage, revolutionary SME groups. Significant differences ($p<0.000$) between the groups are shown in terms of their survival and renewal stage characteristics. Firms in stagnation display significantly lower, while firms undergone radical changes show significantly higher survival characteristics. Firms that have undergone radical changes also have significantly stronger renewal characteristics, while firms displaying incremental changes have significantly lower characteristics. These differences need to be explored further, between the groups to respond to the hypotheses.

Table 13: T-test comparison of current stagnation and incremental development life-cycle characteristics

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Existence	Eq. var. ass.	.818	.369	.007	78	.995	.001673
	Eq. var. not a.			.006	25.875	.995	
Survival	Equal var. ass.	6.488	**.013**	-1.073	78	.287	-.295907
	Eq. var. not a.			-1.371	49.954	.176	
Success	Equal var. ass.	.022	.882	.477	78	.635	.109857
	Eq. var. not a.			.485	30.903	.631	
Renewal	Equal var. ass.	.251	.618	.517	78	.607	.140505
	Eq. var. not a.			.510	29.447	.614	

* In case of a significant (p<0.05) Levene's test, the bottom value of the equality of means test is to be used.

Table 13 presents the t-test comparisons between the stagnation and incremental development SME groups. No significant differences were identified between their life-cycle characteristics, supporting hypothesis H1.

Table 14: T-test comparison of stagnation and radical development life-cycle characteristics and growth

		Levene's Test for Eq. of Var.		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.
Existence	Eq. var. ass.	2.233	.140	.313	65	.755	.073674
	Eq. var. not a.			.269	25.224	.790	
Survival	Equal var. ass.	.644	.425	-2.159	65	**.035**	-.464317
	Eq. var. not a.			-2.329	39.154	.025	
Success	Equal var. ass.	.327	.569	-1.783	65	**.079**	-.388524
	Eq. var. not a.			-1.715	30.647	.096	
Renewal	Equal var. ass.	11.523	**.001**	-3.806	65	.000	-.830802
	Eq. var. not a.			-3.176	24.268	**.004**	
Asset growth	Eq. var. ass.	3.756	.055	-.987	107	.326	-.120131
	Eq. var. not a.			-1.014	106.968	.313	
FTE growth	Eq. var. ass.	.000	.985	-.280	107	.780	-.053750
	Eq. var. not a.			-.278	98.583	.782	
Sales growth	Eq. var. ass.	.360	.550	-1.706	107	**.091**	-.322350
	Eq. var. not a.			-1.690	97.022	.094	

* In case of a significant (p<0.05) Levene's test, the bottom value of the equality of means test is to be used.

Table 14 presents the t-test comparisons between the stagnation and radical development SME groups. Significant differences were identified between the groups in terms of their survival ($p<0.05$), success ($P<0.1$) and renewal ($p<0.01$) life-cycle stage characteristics. Firms undergoing radical development score lower on both survival and renewal characteristics, compared to stagnant firms. This result demonstrates support for H2, showing that firms undergoing radical changes significantly differ from stagnant firms in terms of their organisational characteristics.

Further testing also identified a weak but significant ($p<0.1$) difference in sales growth between the two SME groups. Firms having undergone radical development experienced significantly higher sales growth, supporting hypothesis H3.

Table 15: T-test comparison of survival and renewal stage indicators between stagnation and radical development groups

		Levene's Test for Eq. of Var.		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.
Power widely spread	Eq. var. ass.	.921	.339	-3.156	107	**.002**	-1.013
	Eq. var. not a.			-3.135	98.428	.002	
Information systems monitor and facilitate	Eq. var. ass.	1.699	.195	-1.487	107	.140	-.353
	Eq. var. not a.			-1.501	104.127	.137	
Decisions made by small group	Eq. var. ass.	14.068	**.000**	-3.809	107	**.000**	-.969
	Eq. var. not a.			-3.935	106.869	.000	
Sophisticated org. structure	Eq. var. ass.	1.226	.271	-2.111	107	**.037**	-.515
	Eq. var. not a.			-2.086	95.878	.040	
Team orientated decision making	Eq. var. ass.	6.572	**.012**	-3.614	107	.000	-.959
	Eq. var. not a.			-3.693	106.607	**.000**	
Complex info. system (coordination, service)	Eq. var. ass.	1.161	.284	-2.481	107	**.015**	-.588
	Eq. var. not a.			-2.518	105.529	.013	
Organisation size (larger than comp.)	Eq. var. ass.	1.477	.227	1.247	107	.215	.271
	Eq. var. not a.			1.285	106.988	.202	
Functional, formal structure	Eq. var. ass.	.473	.493	-.001	107	.999	.000
	Eq. var. not a.			-.001	98.690	.999	.000
Sophisticated info. sys. for profit making	Eq. var. ass.	.018	.892	2.600	107	**.011**	.659
	Eq. var. not a.			2.604	101.671	.011	

* In case of a significant ($p<0.05$) Levene's test, the bottom value of the equality of means test is to be used.

Further exploring the specific aspects of differences between stagnant firms and those undergoing radical development, Table 15 presents the t-test comparisons of specific survival and renewal life-cycle stage scores. Accordingly, firms following radical development paths display a significantly wider spread of power

($p<0.01$) and more frequent group decision making ($p<0.000$). They also display significantly more sophisticated organisational structures ($p<0.05$), more team-based decision making ($p<0.000$) and more complex information systems ($p<0.05$). (Significant differences are highlighted in bold.) It can be argued that while the information systems in these organisations show complexity in terms of servicing coordination and service delivery, they are significantly less important in terms of supporting profit making.

5. Discussion and Conclusion

5.1. Discussion of results

To summarise the preceding sections, our findings provide support for some of the conceptualisations of firm life-cycle found in extant literature. While scale validation is not the core objective of our study, this is also an additional merit of our analysis. More importantly, however, our study contributes to the present literature by shedding more light on the magnitude and direction of trajectories which firms follow in their behaviour, which change their organisational characteristics and have impact on their performance. Accordingly, in terms of the distinct paths of firm development, our hypotheses H1, H2 and H3 received empirical support. In the first place, this implies that firms experiencing stagnation or incremental development trajectories are not significantly different from each other when it comes to firm life-cycle characteristics. This result aligns with the expectations driven by Greiner (1972), McMahon (2001), Lester et al. (2003), Massey et al. (2006), Salamonné (2006; 2008), Kiss/Poór (2006) and Takács-György (2014). It is also similar to the empirical evidence on SME life-cycle (Gancarczyk/Gancarczyk 2016), and in particular aligns with the need for organisational change creating dynamic capabilities (Breznik/Lahovnik 2014) in ICT-based SMEs.

Further, Hypotheses H2 and H3 were also supported by the data analysis, demonstrating that firms undergoing a radical change trajectory are significantly different from stagnant ones across a number of relevant organisational characteristics. The findings of Shirokova (2008) and Đurišic-Bojanovic (2016) are corroborated by this outcome, as substantial organisational changes are also accompanied by significant sales growth. In quest for finding additional explanations for these observations, it would be interesting to link to such phenomena as ‘gazelles’, or the lifestyle entrepreneurship (Bridge et al. 2003). Gazelles are particularly high-growth start-ups, targeting a particular market niche, attracting resources and generating employment, based on the expectations driven by the results demonstrated in a short time (Birch 1987). Lifestyle entrepreneurs stop growing because they achieve their non-business objectives by balancing business-related efforts with other demands they perceive on their time (McMahon 2001; Bridge et al. 2003). Finally, necessity driven entrepreneurs are unlikely to

be motivated to develop their businesses, and potentially exit when the external factors driving them to run their businesses cease (Dawson/Henley 2012; Hechavarria/Reynolds 2009). As these factors are mostly manifested at the level of the entrepreneur, as opposed to the organisational level, we believe that there is an opportunity to conduct further research to explore the dynamics of SME life-cycle development, and its impact on SME growth.

5.2. Practical implications

Our paper aimed to address the question what the implications of the magnitude of organisational change are in terms of performance and other organisational attributes. According to Greiner's (1972) understanding, evolutions (incremental changes) and revolutions (radical changes) alternate and follow each other in the path of organisational development, but it was not empirically understood whether and which one of these stages contributed most to organisational performance. In the context of existing gaps in previous studies, it is essential to investigate whether radical changes are really necessary to drive SME performance, or whether can be achievable through planned, evolutionary and regulated changes.

The results summarised above imply that organisations having undergone incremental changes are not significantly different from stagnant – non-changing – organisations. Firms undergoing radical development distinguish themselves from the stagnant firms by team-based, inclusive, group decision-making and developing complex organisational structures, as well as the corresponding information systems supporting coordination and servicing (not profit making, though). This success is also demonstrated by significantly elevated sales growth. While radical development manifests in more complex organisational structures, information systems and inclusive, team-based decision making, these organisations are neither smaller or larger than their competitors. Some manage to maintain a relatively simple, functional organisational structure, and still attach a lot of importance to information exchange at a personal level in their operations. With reference to the challenges identified by Salamonné (2006; 2008), creativity can potentially be addressed by inclusive, team-based decision making, control by means of information systems, delegation and coordination by evolution of introduction of more complex organisational structures.

Our findings also have certain managerial implications. Managers face different challenges at different stages of the development of their organisation. In order to facilitate the process of adaptation to both external and internal factors, firms may need to reconsider their originally assumed paths of development. Appropriate responses to organisational challenges identified above were more complex organisational structures, information systems and inclusive, team-based decision making.

The sampling process highlighted several atypical cases. While it is an ambition of many entrepreneurs to transform their organisations into leading firms in their niches, or even multinational diversified companies, firm growth is a non-linear process which may require temporary contractions of business activity across a number of key dimensions. Eight of the studied companies demonstrated contractions from renewal to success stages. This essentially implies a reduction in organisational complexity, which pertains inter alia to flatter organisational structure and more direct communication. On the one hand, this may mean that some periods of firm development require to downsize operations, such as in times of economic turmoil. The adopted measurement of development stages does not preclude that this simplification should not be regarded as a sign of regression. In reality, firm restructuring may lead to optimised business processes while achieving superior performance in terms of sales, FTE or assets. The realisation of this pattern can be particularly relevant of family-owned SMEs, in which personal motives of owners may relate to a stereotypical understanding of growth. The selection of an appropriate trajectory should be contingent both on the capabilities of the firm, and the dynamics of its competitive environment.

However, the typical respondents undergoing radical changes showed rapid jumps forward. Leapfrogging typical stages of development in a given sector of activity may lead to quicker performance gains and therefore provide a foundation for a sustainable competitive position. Particularly in sectors like ICT, where industry life-cycles have tended to shorten, the speed of adaptation becomes a critical success factor. However, given the aforementioned set of organisational characteristics which are subject to change, firms may become more affected by conflicting pressures and hence require superior organisational capabilities to balance out those pressures. While these sets of pressures were not explicitly examined in our study, they deserve more attention in further research on this matter.

5.3. Conceptual implications

When it comes to conceptual implications, while our study has demonstrated that radical development coincides sales growth, and its outcome is characterised by the above described organisational complexity, these organisations still remain versatile and retain many of their earlier characteristics. This suggests a particular type of organisational ambidexterity (Tushman/O'Reilly 1996), referred to as structural ambidexterity (Gibson/Birkinshaw 2004), in which organisations become capable to simultaneously balance conflicting demands. The suggested dynamic approach by Breznik/Lahovnik (2014) and the conceptual suggestions of Levie/Lichtenstein (2010) point toward the need for further research to be conducted to explain the potential performance impact of the identified radical change dimensions. While our results demonstrate that radical leaps

in organisational development as opposed to the average, typical path coincide with sales growth, this study cannot claim any explicit implication as to the direction of causality of the relationship between organisational development and firm growth. Hence, it remains for further research to gather evidence of the directionality of this relationship. This would ideally necessitate a longitudinal study using advanced multi-variate techniques to account for the dynamic character of the phenomenon. Similar research directions exploring the direction of relationships between various firm performance measures was recommended by Davidsson et al. (2009).

5.4. Limitations

The limitations of the research results also require attention. The sample size on which the analysis was built was insufficient for covariance-based multivariate analytical techniques, hence PLS was used to validate the measures. A larger sample would allow generating statistically more robust results. The response rate was also relatively low compared to other studies, hence representativeness and the ability to generalise the results is limited. It would be interesting to explore to what extent situational factors (country, industry, time of data collection) influenced the results. This would require the incorporation of further contextual variables into a consecutive study. Finally, as pointed out earlier, the proportion of micro-enterprises was high in the sample. And although this seems to be representative to the total population of firms, it may not entirely serve the purpose of the firm, in particular because organisational development may remain relatively simple in micro-businesses. Therefore, future research may explore the possibility of acquiring a purposeful, stratified sample where larger organisations are represented in higher numbers, to increase the relevance of the findings and exploring differences in the development paths between different types of organisations and different sectors.

Not least, our study did not take into account the specific sets of external factors which affect the trajectories of firms. These may include factors such as the intensity of competition, overall economic development, legal changes, or other exogenous variables beyond firm control. These can affect organisational change to a large extent, either as direct effects, or moderating effects. Their exploration can be a promising avenue for further research and a valuable addition to extant research based on the life-cycle concept.

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