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The Effect of Organisational Age and Size on Position and Paradigm Innovation

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Review

The Effect of Organisational Size and Age on Position and Paradigm Innovation

Abstract

- Purpose: This article contributes to knowledge and theory on innovation in SME's by exploring the role of size and age on organisational engagement with position and paradigm innovation.
- Design/methodology/approach: Data on organisational characteristics, including age and size, and engagement with position and paradigm innovation was collected as part of a questionnaire based survey of food sector SMEs in the UK. Structural equation modelling was used to identify the existence of any significant relationships between engagement with position and paradigm innovation and organisational age and size.
- Findings: Findings suggest that organisational engagement with position and paradigm innovation is not affected by either age or size.
- Originality/value: Prior research, based primarily on process and product innovation, has generated contradictory results regarding whether size or age effect innovation. This study contributes by focusing on the previously unexplored concepts of position and paradigm innovation.

Keywords: Position innovation; Paradigm innovation; Organisational innovation; Organisational size; Organisational age; SMEs.

Introduction

As marketplaces become more dynamic, interest in innovation, its processes and management has escalated. Organisations need to innovate in response to changing customer expectations and lifestyles and to capitalize on opportunities ensuing from new technologies and changing marketplaces and structures. Organisational innovation can be grouped into four main categories, product, process, position and paradigm (Bessant et al., 2005). Past research focuses on product and process innovations (e.g., Capitanio et al., 2010; Damanpour and Aravind, 2006; De Jong and Vermeulen, 2006; Cooper and Edgett, 2010) leaving the concepts of position and paradigm innovation under researched.

There is a general belief that various organisational characteristics affect the way in which organisations behave and perform (e.g., Madrid-Guijarro et al., 2009; Pullen et al., 2009; Bierly III and Daly, 2007). This has encouraged context specific research on the basis of organisational characteristics (Rosenbusch et al., 2011) and has prompted various researchers to investigate the relationship between organisational characteristics, such as size and age on innovation activities and performance (e.g., Voss et al., 1998; Laforet, 2013; Brown and Kaewkitipong, 2009; Camisón-Zornoza et al., 2004; Ndubisi and Iftikhar, 2012; Vaccaro et al., 2012). However, the majority of this research has been performed in the context of medium and large-sized organisations. Although attempts have been made to apply this research to SMEs (Laforet, 2009), a recent study by Laforet (2013) calls for more research that focuses on the differences between SMEs and large firms.

In addition, the existing literature on the relationship between organisational characteristics and innovation has so far been unsuccessful in reaching an agreement as to whether organisational age and size affect innovation activities and/or performance. In addition, previous research is largely focused on process and product innovation. This leaves a gap for further research on other types of innovation such as organisational innovation, business model

1
2
3 innovation, and, position and paradigm innovation.

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5 Finally, although SMEs are seen as important to the development of the economy and
6
7 extensive research has been conducted on innovation in SME's, this body of literature could
8
9 benefit from more research in this area, specifically focusing on the relationship between
10
11 organisational characteristics and engagement with types of innovation (Laforet, 2008). In
12
13 addition, more research into the innovation practices of food and drink sector SMEs is required
14
15 (Avermaete et al., 2004; Capitanio et al., 2009; Ma and McSweeney, 2008; Baregheh et al.,
16
17 2012b). This sector is the largest manufacturing sector within the EU and is one of the main
18
19 drivers of the EU economy, contributing to both economic output and employment (Avermaete,
20
21 2002; Menrad, 2004; Traill, 1998). The innovation imperative is very strong for firms in this
22
23 sector, and plays a key role in sustaining and enhancing their competitiveness as innovation is
24
25 necessary for their survival and growth (Capitanio et al., 2010; Grunert et al., 1997;
26
27 Parasuraman et al., 1985; Rama and Von Tunzelmann, 2009; Grunert and Traill, 2012).

28
29 The research reported in this article aims to explore the role of organisational characteristics
30
31 on the under researched concepts of position and paradigm innovation. This exploration will be
32
33 on the basis of business managers' perceptions of their level of engagement with position and
34
35 paradigm innovation. The term engagement refers to adoption or development of innovations.
36
37 More specifically, the objectives of this study are to:

- 38
39 • Determine whether organisational age affects level of organisational engagement with
40
41 position and paradigm innovation
- 42
43 • Determine whether organisational size affects level of organisational engagement with
44
45 position and paradigm innovation

46
47 This study contributes to the literature by adding to the knowledge of position and paradigm
48
49 innovation and of innovation within SMEs, and provides direction for future research in this
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51 context. Furthermore, research into the link between organisational size and age and innovation
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3 activities is useful for managers and policy makers working in or with SMEs, as it will help to
4
5 understand the nature and significance of size and age specific differences of organisations.
6

7 This paper begins with a literature review on innovation and food SMEs and development of
8
9 hypotheses. This is followed by an outline of the methodology, including data collection and
10
11 analysis. Finally, the findings from this study are discussed, and conclusions, implications, and
12
13 recommendations are presented.
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16
17

18 **Literature Review and Hypothesis Development**

19
20 This literature review commences with an introduction to the key concepts and models in the
21
22 areas of degree and types of innovation that have informed the design of this research. For the
23
24 purpose of clarity, innovation in this study is defined as:
25
26

27 “The multistage process whereby organizations transform ideas into new / improved
28
29 products / services or processes, in order to advance, compete and differentiate themselves
30
31 successfully in their marketplace.” (Baregheh et al., 2009, p. 1334)
32
33
34

35 *Innovation Types*

36
37 Innovations vary on the basis of their nature and outcome. Considerable discussion on the
38
39 categorization of innovation has been conducted in pursuit of a stronger foundation for
40
41 innovation research and practice. One main approach to the classification of innovations is that
42
43 of types of innovation.
44
45

46
47 Innovation type categorizations are based on the outcome of the innovation process. Many
48
49 classifications of innovation types/outcomes have been introduced over the years. One of the
50
51 earliest models is proposed by Knight (1967) where four types of innovation are identified:
52
53 organisational structure, production process, people, and product/service. Other scholars have
54
55 proposed binary models of types of innovation such as administrative and technical; incremental
56
57 and radical; product and process (e.g., Bantel and Jackson, 1989; Daft, 1978; Damanpour and
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1
2
3 Evan, 1984; Damanpour, 1991; Evan, 1966). A number of integrative models have been
4
5 proposed more recently, all of which identify a number of different types of innovation. For
6
7 example, Oke et al. (2007) discuss product (including radical and incremental), service, and
8
9 process (including administrative, service and production) innovations. Another recent typology,
10
11 which is of particular interest for this research is that of Francis and Bessant (2005) which
12
13 identifies four types of innovation: position, process, product, and paradigm innovation. These
14
15 are defined thus:

- 16
17 • “Product innovation, changes in the things (products/services) which an organization
18
19 offers,
- 20
21 • Process innovation, changes in the way in which things (products/services) are
22
23 created and delivered,
- 24
25 • Position innovation, changes in the context in which products/services are introduced,
- 26
27 • Paradigm Innovation, changes in the underlying mental models which frame what the
28
29 organization does.” (Bessant and Tidd, 2007, p. 13)
- 30
31

32
33
34 Position and paradigm innovations are different from product and process innovations as they
35
36 often entail strategic shifts within the organisation (Francis and Bessant, 2005). They result in
37
38 big changes in the organisations’ strategies and operations and are important as they often lead
39
40 to product and process innovations. Position innovations can be viewed as marketing
41
42 innovations where the organisation changes the position/context of the product within an
43
44 existing market or a new market. An example of a position innovation would be the re-
45
46 positioning of Haagen Dazs ice cream towards adults as opposed to children (Francis and
47
48 Bessant, 2005). Position innovations can lead to product and process innovations; for example,
49
50 targeting adults for ice-cream (as opposed to children) leads to changes in packaging and
51
52 flavours. Paradigm innovation entails an even bigger shift, where the organisation changes the
53
54 product offering, the processes, markets and strategies leading to dramatic change to the
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1
2
3 business model. Radical paradigm innovation can be seen as breakthrough innovation leading to
4 major changes. An example of such an innovation is Skype which has made a significant impact
5 on the way in which people communicate with one another. The shift from production of
6
7
8 tobacco to kale chips by BrandNeu Foods in Ontario is an example of paradigm innovation
9
10 within the food sector. This study adopts Bessant and Tidd (2007)'s typology of innovation as
11
12 this recent categorization covers all types of innovation (Rowley et al., 2011).
13
14

15
16 Although the specific role of organisational characteristics, such as size and age, on
17
18 innovation has been explored previously, past studies primarily concentrate on product and
19
20 process, administrative and technical or, radical and incremental innovations (Camisón-Zornoza
21
22 et al., 2004). Hence, there is a need for research on other types of innovation, such as position
23
24 and paradigm innovation.
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26

27 28 *Research inconsistencies*

29
30 The literature on the relationship between size and age of organisation, and innovation has
31
32 not reached a consensus. A meta analysis study by Camisón-Zornoza et al. (2004) links these
33
34 inconsistencies to the divergence of the dimensions and methods used to analyse organisational
35
36 characteristics and innovation, together with the varying study contexts (Tables 1 and 2). For
37
38 example, while some studies measure innovation on the basis of inputs (R&D expenditure) or
39
40 outputs (number of new products) of the innovation process (e.g., Pla-Barber and Alegre, 2007;
41
42 Shefer and Frenkel, 2005), other studies criticize these approaches because they do not cover
43
44 many aspects of innovation (Traill and Meulenber, 2002). Furthermore, some studies are based
45
46 on a few case studies (e.g., Brown and Kaewkitipong, 2009), whilst other studies conduct
47
48 correlation and regression analysis on the basis of a single independent or dependent variable,
49
50 measuring input and output of innovation (e.g., Camisón-Zornoza et al., 2004; Stock et al.,
51
52 2002). In addition, the differences in the findings from past research might also stem from the
53
54 diversity of measurements adopted for size (by number of employees) and age (years from
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1
2
3 establishment). For example, whilst some studies have adopted the European definition of
4 SMEs (less than 250 employees) (e.g., Laforet, 2008; O'Regan and Ghobadian, 2004), others are
5 based on the American definition with an employee cap of 500. As regards to firm age, Huergo
6 and Jaumandreu (2004), for instance, categorized firm age as new-born, continuing, and exiting
7 firms, whereas, Rosenbusch et al. (2011) categorize age as young (less than 12 years) and
8 mature (more than 12 years). Finally, Benner and Tushman (2002; 2003) suggest that the
9 innovative behaviour and outcome of organisations is independent of their size and age, but
10 dependent on the organisation's process management activities such that by focusing on
11 efficiency organisations encourage exploitation while neglecting exploration.
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15
16 In order to provide a more standardized view of the role of organisational characteristics, this
17 study has adopted the well-referenced and adopted EU definition of SMEs with regards to
18 organisational size (e.g., McAdam et al., 2004; Mosey et al., 2002). Organisational age has been
19 measured as continuous. Further, new measurement scales are developed and tested, to avoid
20 reliance on input and output measures of innovations.
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23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60

Organisational Size

Organisations perform differently due to their size specific characteristics. Small firms are viewed as more flexible and innovative (Acs and Audretsch, 1990; Winters and Stam, 2007), whilst larger firms have more resources and capabilities arising from their economies of scale (Winters and Stam, 2007). Thus, organisational size can be seen to convey both advantages and disadvantages to innovative behaviour.

While most studies demonstrate a positive association between organisational size and innovation (e.g., Damanpour, 1992; Laforet, 2013; Camisón-Zornoza et al., 2004; Laforet, 2008), Wakasugi and Koyata (1997) and Laforet and Tann (2006) reject such a relationship and, Salavou et al. (2004) report a negative association. In an attempt to shed some light to the inconsistencies of the past literature Table 1 identifies key prior studies on organizational size.

1
2
3 Research on the role of size on engagement with position and paradigm innovation is scant
4 and such research lacks a consensus (Brown and Kaewkitipong, 2009). Liu (1995) focuses on
5 position innovation and identifies a difference in the level of market orientation between
6 medium and large companies. However, Laforet (2008) in a study of manufacturing SMEs
7 found no relationship between market orientation and size. Research on the relationship between
8 either business model innovation or paradigm innovation and firm size is non-existent, although
9 there are studies on business models and strategic orientation (e.g., Morris et al., 2005; Zott and
10 Amit, 2008). For example, Laforet (2008) suggests a relationship between strategic orientation
11 and size.
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30 Most relevant to this study and in relation to position innovation, differences were found
31 between small and medium sized organisations in terms of application of IT for e-business
32 (Brown and Kaewkitipong, 2009), with small companies lagging behind those of medium size.
33
34 Other studies that undertake a meta analysis of empirical studies identify a strong positive
35 association between size and innovation (Camisón-Zornoza et al., 2004; Damanpour, 1992). A
36 recent multi-sector study by Laforet (2013) identifies a positive relationship between size and
37 innovation outcome. In addition, focusing on SME's Laforet (2008; 2009) found that non-hi-
38 tech manufacturing SMEs exhibited a positive relationship between organisational size,
39 innovation, process innovation, innovativeness and strategic orientation. Finally, considering
40 that both position and paradigm innovations result in big changes in the organisational strategy
41 and operations and often encapsulate product and process innovations, and, as larger
42 organisations have more resources and capabilities (Winters and Stam, 2007) to invest on
43 innovations and prevail failure (Hartley et al., 2013), they are then better abled to manage
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3 strategic shifts within the organisation (position and paradigm innovations). Accordingly, this
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5 study proposes the following hypotheses:

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8 | *H1: A direct positive relationship exists between organisational size and*
9
10 *position innovation*

11
12 *H2: A direct positive relationship exists between organisational size and*
13
14 *paradigm innovation*
15
16

17 18 19 20 *Organisational Age*

21
22 Organisational age can have both a negative and positive effect on organisations. Older firms
23 have more experience, and have established relationship networks, technical competencies, and
24 new product development processes and routines (Bierly III and Daly, 2007). On the other hand,
25 older firms can be more bureaucratic (Bierly III and Daly, 2007). Meanwhile, younger firms are
26 often more flexible and are more likely to develop radical innovations, but may still be working
27 on facilitating their learning process (Bierly III and Daly, 2007; Sørensen and Stuart, 2000).

28
29 Withers et al. (2011) associates these contradictions with firms' innovation capability (ability to
30 identify innovation opportunities, manage resources and exploit the noted opportunities),
31 suggesting that when older and younger organisations have the same level of innovation
32 capability, older firms display greater innovation activity. However, this relationship reverses
33 when neither older or younger firms in a sector display high levels of innovation capability.
34
35

36
37 Although a few scholars have studied the role of organisational age on innovation (e.g.,
38 Sørensen and Stuart, 2000; Laforet and Tann, 2006; Winters and Stam, 2007), there is scope for
39 more research on this topic (Balasubramanian and Lee, 2008). Similar to research examining the
40 effect of organisational size, researchers have reached contradictory results. While a number of
41 studies suggest that organisational age has no effect on innovation activities (e.g., Avermaete et
42 al., 2003b; Laforet and Tann, 2006; Laforet, 2013), other studies suggest a negative (e.g.,
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3 Huergo and Jaumandreu, 2004; Rosenbusch et al., 2011) or a positive (e.g., Sørensen and Stuart,
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5 2000; Winters and Stam, 2007) relationship (Table 2).
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10 *Insert Table 2 here.*
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14 Regarding types of innovation, Avermaete et al. (2003a) and Cefis et al. (2007) identify that
15
16 organisational age does not affect product and process innovations and resources. Meanwhile
17
18 the study conducted by Winters and Stam (2007) suggests a positive effect of firm age on
19
20 product innovation but no significant relationship between age and process innovation. More
21
22 relevant to this study, a meta analysis of 42 empirical studies suggests a negative relationship
23
24 between age and innovation performance (Rosenbusch et al., 2011). More specifically in the
25
26 food, beverage and textile sector, Salavou et al. (2004) identified a negative relationship
27
28 between age and organisational innovation. Nevertheless, the role of organisational age on
29
30 position and paradigm innovation has not been studied. In addition, risk taking plays an
31
32 important role on the decision to develop and adopt innovations which has been negatively
33
34 associated with age (Desai, 2008). Further, as both position and paradigm innovation involve
35
36 changes to the organisational business model, and hence, changes to organisational routines, it
37
38 can be concluded that younger organisations would be better suited to develop them as older
39
40 organisations are more bureaucratic (Bierly III and Daly, 2007) and are tied by the routines that
41
42 they have developed over time (Hui et al., 2013). On the other hand, younger firms are more
43
44 flexible and are prone to engage in radical changes (Bierly III and Daly, 2007; Sørensen and
45
46 Stuart, 2000). Accordingly, this study suggests the following hypotheses:
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52 *H3: A direct negative relationship exists between organisational age and position*
53
54 *innovation*
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3 *H4: A direct negative relationship exists between organisational age and paradigm*
4
5 *innovation*
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8 ***Innovation in Food Sector SMEs***

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11 The food sector plays an important economic role. Research into innovation in the food
12
13 sector embraces topics such as: research and development (e.g., Bougheas, 2004; Love and
14
15 Roper, 1999); networks and the supply chain (e.g., Drivas and Giannakas, 2006; Fortuin and
16
17 Omta, 2009); innovative behaviour (e.g., Avermaete et al., 2003b; Rama and Von Tunzelmann,
18
19 2009); product and process innovation (e.g., Avermaete et al., 2004; De Jong and Vermeulen,
20
21 2006); and, technology (e.g., Bigliardi and Dormio, 2009; Rodgers, 2008). Nevertheless, there
22
23 are gaps in relation to research on drivers of innovation, types of innovation, and innovation
24
25 orientation (Avermaete et al., 2003b; Menrad, 2004; Fortuin and Omta, 2009). In particular,
26
27 there is a lack of sector specific research on the effect of organisational characteristics on
28
29 innovation (Pla-Barber and Alegre, 2007) as well as with a lack of empirically tested studies on
30
31 innovation in the context of food SMEs (Avermaete et al., 2004; Muscio et al., 2010; Baregheh
32
33 et al., 2014; Baregheh et al., 2012a).
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37
38 To conclude, although previous research has demonstrated the potential for a relationship
39
40 between organisational characteristics, such as age and size and organisational engagement with
41
42 specific types of innovation (Laforet, 2013), there are two significant gaps in research relating to
43
44 position and paradigm innovation and, the important context of food SMEs (Baregheh et al.,
45
46 2014).
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Methodology

Research approach

To explore the role of organisational size and age on position and paradigm innovation within the food and drink sector, a survey was conducted. Questionnaires were chosen to collect data as they are suitable for gathering large amounts of data and collecting accurate information (Saunders et al., 2003). Such a quantitative research method enables this study to generalize the effect of size and age on innovation among food sector SMEs. Questionnaires are also the main method of data collection in many previous innovation studies (e.g., McAdam et al., 2004; Avermaete et al., 2003b; Zeng et al., 2010).

Questionnaire design and item generation

To conduct this study, organisational size and age and, engagement with position and paradigm were measured. Organisational size was measured on the basis of number of employees, hence respondents were required to identify their organisation's size on the basis of the three categories identified in the European Union's definition of SMEs (2003): micro (less than 10); small (10-49); and, medium (50-249). Age was measured on the basis of the year of establishment of the organisation.

Two measurement scales were developed to measure position and paradigm innovation; the scale items are presented in Table 3 together with reference to the previous studies from which they were derived. Allocation of resources to development of innovations and, development of both radical and incremental innovations are pivotal attributes of an innovation orientated organisation (Francis and Bessant, 2005; Siguaw et al., 2006). Hence, three items reflecting these attributes were allocated to each scale (Table 3). In addition, a number of position and paradigm specific questions were included for each scale (Table 3). For position innovation, four statements were included that identified the level of the organisation's engagement in

1
2
3 branding, marketing and promotions, e-marketing and Customer Relationship Management
4
5 (Francis and Bessant, 2005; Homburg et al., 2000). For paradigm innovation three statements
6
7 were included that identified the level of organisational engagement with analysis of strategies
8
9 and business models, partnering and alliances, and, outsourcing, mergers and acquisitions
10
11 (Francis and Bessant, 2005).
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19 | *Insert Table 3 here.*
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21

22
23 Respondents were invited to respond to the statements regarding their organisation's
24
25 engagement with different aspects of position and paradigm innovation using a 5-point Likert-
26
27 style rating scale ranging from *always* to *never* (Saunders et al., 2003). In addition, a number of
28
29 questions on organisational characteristics were added to the questionnaire to profile the sample
30
31 and its respondents, including location and product range.
32
33

34 The questionnaire was designed to be completed by people with managerial positions within
35
36 food SMEs who deal with innovations. Managers are aware of their firm's strategies, business
37
38 model, plans and organisational culture, and they are in a good position to comment on their
39
40 firm's innovations (Bryman and Bell, 2007).
41
42

43 BIC Innovation, a UK-based business consultancy, was initially consulted to ensure the
44
45 applicability and suitability of the questionnaire to the food sector, in terms of the
46
47 appropriateness of the language and content of the questionnaire for the target audience. The
48
49 questionnaire was then piloted by distribution to five food sector SMEs selected from BIC
50
51 Innovation's clients to further ensure its suitability. The only change made as the result of this
52
53 process was the removal of a question on profiling the organisation's finances, as the
54
55 respondents found this question too sensitive.
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Data collection and analysis

The questionnaire was distributed via two channels in order to optimize response:

- Online questionnaires on SurveyMonkey were distributed to managers of food SMEs in Wales and England through BIC Innovation's databases, and partner organisations of BIC Innovation (93 questionnaires were collected out of 1594 distributed, response rate 5.8%).
- Questionnaires were distributed and collected by the lead author to managers of food SMEs at a number of food festivals and exhibitions held throughout England and Wales (156 questionnaires was collected out of 250 handed out, response rate 62%).

Non-probability sampling, utilized in many research projects (Hair et al., 2007) and numerous studies on SMEs (e.g., McMahon, 2001; Ritchie and Brindley, 2005; Rickards et al., 2001; Becherer et al., 2001; Gassmann and Keupp, 2007), was adopted to collect data.

However, with regards to the selection of food fairs, a purposive sampling approach was undertaken to ensure the sample is representative of the target population (Hair et al., 2007).

Food fairs of different sizes, from around the country, and in big and small cities were selected.

Two hundred and twenty two usable questionnaires were collected. The profiling questions on the size of the organisation, role of the respondent and also the SIC code were checked to ensure the respondent is in a managerial role of a food SME. Collected questionnaires with more than 10 percent missing data were excluded, resulting in 188 questionnaires being used in the analysis. Data were first entered and coded in Excel, and then imported into SPSS 20 and Lisrel 8.8. Structural Equation Modelling (SEM) was adopted to identify whether a significant relationship exists between the constructs of position and paradigm innovation and age and size of the organisation. SEM is the appropriate statistical technique when testing a model that was hypothesized a priori and which assesses the relationship among latent constructs that are

1
2
3 measured by multiple scale items (Hair et al., 1995). Additionally, it allows researchers to
4
5 estimate the strength of relationships among scale items and latent constructs, while giving the
6
7 investigator an indication of the overall model fit. Finally, it allows measurement error to be
8
9 attributed to the associated measurement variables.
10

11 12 13 14 15 16 **Results**

17 18 19 *Respondents' Profile*

20
21 The majority of respondents (68%, n=127) are micro firms, 21% (n=40) are small firms, and
22
23 11% (n=21) are medium-sized firms. The size profile of the sample compares well with the size
24
25 distribution of food manufacturers in the UK, where 64% of the firms are micro, 25% are small
26
27 and 11% are medium (Wetherill, 2009). In addition, it is apparent that within this sample there
28
29 are fewer companies aged 21+ in comparison with the younger firms, consistent with the fact
30
31 that not all start-up companies survive, leading to fewer older companies (Feinleib (2011)).
32
33

34
35 In terms of location, 78% of the firms are based in England, with 16% in Wales, and 6% in
36
37 Scotland. This distribution is broadly representative of the UK food sector: the UK Department
38
39 for Business Innovation & Skills (2014) identifies that 86% of firms within the UK are based in
40
41 England, 4% in Wales, 6% in Scotland, and 2% in Northern Ireland.
42
43

44 45 *Findings*

46
47 To test the theoretical model presented in Figures 1 and 2, the psychometric properties of the
48
49 scales used to measure the two latent constructs of the study, Position Innovation (POSI) and
50
51 Paradigm Innovation (PARA), were established. In order to accomplish this, inter-item and
52
53 inter-scale correlations, tests of reliability, confirmatory factor analysis (Anderson and Gerbing,
54
55 1988), and tests of convergent validity were performed. With respect to the confirmatory factor
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3 analysis, multiple fit criteria were used to assess the appropriateness of the measurement models
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5 tested (Bollen and Long, 1993; Hair et al., 1995).
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10 *Insert Figure 1 here.*
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13 *Insert Figure 2 here.*
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16 17 *Scale Reliability*

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19 Scale reliability provides a measure of the internal consistency and homogeneity of the items
20 comprising a scale (Churchill, 1979) and was calculated using Cronbach's alpha. Position
21 Innovation had an $\alpha=0.91$ and Paradigm Innovation had an $\alpha=0.89$ indicating a high level of
22 internal consistency for the scales. Both scales displayed composite reliability values in excess
23 of the 0.70 recommended (Churchill, 1979), providing strong evidence of the reliability of the
24 scales used.
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33 34 *Inter-item Inter-scale Correlations*

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36 The inter-item scale and inter-scale correlations were calculated for each set of items within
37 each of the scales. All inter-items were significantly correlated within their corresponding scales
38 ($p<0.01$). The average inter-item correlations for the two scales were: POSI at $r=.55$ and PARA
39 at $r=0.57$. Also the average inter-scale correlation for the two scales was $r=0.66$. All inter-item
40 and inter scale correlations in this study were above the recommended value of $r=0.3$ (Hair et
41 al., 1998) indicating a strong inter-relationship among the measurement variables for each of the
42 two constructs as well as their composites.
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52 53 *Convergent validity*

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55 Convergent validity is demonstrated when a set of alternative measures accurately represents
56 the construct of interest (Churchill, 1979). Convergent validity was assessed reviewing the level
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3 of significance for the factor loadings using a confirmatory factor analysis (CFA) of the items of
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5 each of the two scales (Long, 1983). If all the individual item's factor loadings are significant,
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7 then the indicators are effectively measuring the same construct (Anderson and Gerbing, 1984)
8
9 and the construct is one-dimensional. As reported in table 4, the standardized coefficients from
10
11 the CFA of the 13 measurement variables in the two scales (position and paradigm) were
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13 moderately large and significant ($p < 0.05$). The results provide satisfactory evidence of
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15 convergent validity for the indicators used to measure each of the scales in this study.
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21 *Insert Table 4 here.*
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23 24 *Discriminant validity.*

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26 Discriminant validity is assessed among the latent variables and their associated measurement
27
28 variables by fixing (that is constraining) the correlation between pairs of constructs to 1.0, then
29
30 re-estimating the modified model (Segars and Grover, 1993). The condition of discriminant
31
32 validity is met if the difference of the chi-square statistics between the constrained and standard
33
34 models is significant (1 *df*). The chi-square difference tests, from each construct pairing, were all
35
36 significant which indicates that discriminant validity exists among all of the constructs in this
37
38 study ($p < 0.01$). Thus, each construct is measuring a distinct underlying latent variable.
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42 43 *Model and Hypotheses Testing*

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45 First the model fit and hypothesis test for the relationship between age and size, and position
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47 innovation is described, thereafter the model fit and hypothesis test for age and size, and
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49 paradigm innovation is discussed.
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52 53 *Position Innovation*

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55 Prior to assessing the study's hypotheses, the model's overall fit must be established (Bollen
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57 and Long, 1993). The chi-square statistic was significant ($\chi^2=62.07$, $df=26$, $p=0.00$). With
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3 respect to the fit indices, the ratio χ^2/df (62.07/26) and RMSEA, with values of 2.38 and 0.087,
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5 respectively, were below the recommended maximum of 3.00 and 0.10 (Chau, 1997). Similarly,
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7 the standardized RMR was below the 0.10 minimum acceptable level, with a value of 0.074.
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10 Additionally, the indices NNFI, CFI, RFI, IFI and NFI were all above the minimum acceptable
11
12 0.90 level, with values of 0.97, 0.98, 0.95, 0.98 and 0.96 respectively (Chau, 1997). The results
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14 of the structural model estimation are shown in Figure 1. Thus, the model appears to fit
15
16 reasonably well.
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19 The test of the proposed hypotheses is based on the direct and indirect effects of the structural
20
21 model presented in Figure 1. The LISREL coefficients between latent variables give an
22
23 indication of the relative strength of each relationship (Jöreskog and Sörbom, 1993). All seven
24
25 measurement variables loaded significantly ($p < 0.05$) on their respective constructs (POSI), and
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27 their individual loadings can be seen in Figure 1. H1 and H3 were tested at the significance level
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29 $p < 0.05$.
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32 The first hypothesis suggests that *a direct positive relationship exists between organisational*
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34 *size and position innovation*. As shown in Figure 1, the path relating these two constructs was
35
36 not significant (standardized γ_1 coefficient = 0.25; $t = 1.34$, $p > 0.05$). This finding indicates that no
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38 significant relationship exists between an organisation's size and its engagement with position
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40 innovation.
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43 The third hypothesis suggests that *a direct relationship exists between organisational age and*
44
45 *position innovation*. As shown in Figure 1, the path relating these two constructs was not
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47 significant (standardized γ_1 coefficient = -0.16; $t = -1.23$, $p > 0.05$) this indicates that no
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49 significant relationship exists between an organisation's age and its engagement with position
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51 innovation.
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Paradigm Innovation

The chi-square statistic was significant ($\chi^2=36.85$, $df=19$, $p=0.009$). With respect to the fit indices, the ratio χ^2/df ($36.85/19$) and RMSEA, with values of 1.93 and 0.071, respectively, were below the recommended maximum of 3.00 and 0.10 (Chau, 1997). Similarly, the standardized RMR was below the 0.10 minimum acceptable level, with a value of 0.052. Additionally, the indices NNFI, CFI, RFI, IFI and NFI were all above the minimum acceptable 0.90 level, with values of 0.93, .095, 0.91, 0.96 and 0.94 respectively (Chau, 1997). The results of the structural model estimation are shown in Figure 2. Thus, the model appears to fit reasonably well.

The test of the proposed hypotheses is based on the direct and indirect effects of the structural model presented in Figure 2. The LISREL coefficients between latent variables give an indication of the relative strength of each relationship (Jöreskog and Sörbom, 1993). H2 and H4 were tested at the significance level $p<0.05$. All six measurement variables loaded significantly ($p<0.05$) on their respective constructs (PARA); their individual loadings can be seen in Figure 2.

The second hypothesis suggests that a direct positive relationship exists between organisational size and paradigm innovation. As shown in Figure 2, the path relating these two constructs is one tailed significant (standardized γ_1 coefficient=0.40; $t=1.93$, $p=0.053$), indicating a strong positive trend between size and paradigm innovation. Nevertheless, this indicates no significant relationship between an organisation's size and its engagement with paradigm innovation exists.

The fourth hypothesis suggests that a direct relationship exists between organisational age and paradigm innovation. As shown in Figure 2, the path relating these two constructs was not significant (standardized γ_1 coefficient=- 0.09; $t=- 0.54$, $p>0.05$). This finding indicates no significant relationship between an organisation's age and its engagement with paradigm innovation exists.

Discussion and Conclusion

This article explores the significance of organisational characteristics on position and paradigm innovation. This study is valuable as the body of literature on the role of antecedents of innovation is highly fragmented and contradictory, and the bulk of past research mainly focuses on product and process innovation (e.g., Wakasugi and Koyata, 1997; De Mel et al., 2009; Huergo and Jaumandreu, 2004). Additionally, although some scholars have highlighted the need for a context specific understanding of the role of organisational characteristics (Laforet and Tann, 2006), the food sector is a context that has been neglected.

This study suggests that food SMEs of different size groups do not perform differently from one another on the basis of their position and paradigm innovations. The lack of a relationship between organisational size and innovation is consistent with findings from research conducted by Wakasugi and Koyata (1997), O'Regan and Ghobadian (2004) and Laforet and Tann (2006). With regards to position innovation, the finding is also consistent with Laforet (2008)'s finding that there is no relationship between market orientation and firm size. Additionally, this study questions the suitability of McAdam et al. (2004)'s suggestion on breaking down SMEs on the basis of their size within innovation studies in the context of the food sector. Focusing on age and innovation, although a number of studies suggest a positive or negative relationship between age and innovation (Rosenbusch et al., 2011; Sørensen and Stuart, 2000), this study does not find any significant relationships between organisational age and position and paradigm innovation; this finding confirms Avermaete et al. (2003b), Cefis and Marsili (2005) and Laforet (2013). Perhaps lack of a relationship between position and paradigm innovation, and, organisational size and age is due the specific characteristics of position and paradigm innovations, which lead to big shifts to the organisational business model, strategies or repositioning of the products. Position and paradigm innovation are manager-led (Francis and

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3 Bessant, 2005), and, as such their adoption is more dependent on the decision makers than on
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5 organisational characteristics.
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7 The findings of this study imply that categorization of organisations on the basis of age and
8 size is not necessary within innovation research among food SMEs. This is novel due to its
9 focus on position and paradigm innovation, which are different in nature and implications from
10 product and process innovation and lead to change within the entire organisation or positioning
11 of the company or their product. This study contributes to the literature by: 1) exploring the
12 relationship between organisational characteristics and engagement with position and paradigm
13 innovation; and, 2) focusing on the neglected context of food SMEs. The findings of this study
14 suggest an absence of direct relationships between organisational size and age, and, position and
15 paradigm innovation. Therefore, position and paradigm innovation studies and theories could
16 be generalized regardless of any age and size differences within organisations at least as far as
17 food SMEs are concerned.
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32 Lack of a direct relationship between organisational characteristics, and position and
33 paradigm innovation suggests that the differentiating factor between organisations may be the
34 organisational attitude towards innovation or perhaps their innovation capabilities and their level
35 of endorsement of process management and its impact on their engagement with innovations
36 (Benner and Tushman, 2003) rather than their organisational characteristics. Researchers could
37 further test this proposal. In addition, as this study is limited to SMEs (less than 250 employees)
38 and the food sector, the findings of this study could be tested within other sectors and among
39 larger organisations. As for practitioners, this study undermines the myths that certain
40 organisations are better at innovation due to their size and age attributes. In other words,
41 although organisations hold certain attributes based on their specific characters (e.g. smaller
42 organisations are more flexible or larger organisations have more resources), these specific
43 attributes do not have any significant direct effect on engagement with position and paradigm
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3 innovations. On a broader note, this study suggests that regardless of age and size,
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5 organisational attitude and culture towards innovation are what differentiate organisations from
6
7 one another. Hence, managers, policy makers and consultants should not focus on organisational
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9 size and age when seeking to understand under-achievement in innovation performance, and
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11 policy makers should not take size and age into account in offering support to food SMEs.
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Table 1. Literature on organisational size and innovation

Reference	Relevant focus	Outcome	Measure of innovation	Measure of size	Sector	Method
Camisón-Zornoza et al., 2004	Relationship between firm size and innovation	Significant positive correlation	Numbers of product, process, administrative, technical, incremental, radical innovations	Number of employees, total assets, capacity and other contextual factors	-	Meta analysis
Damanpour, 1992	Relationship between firm size and innovation	Significant positive correlation	Rate of adoption of innovation or innovativeness	Number of personnel, non personnel (e.g., capacity), direct and log transformation	-	Meta analysis
Laforet, 2008	Relationship between firm size and innovation	Significant association	Patented product and innovation prize	Number of employees	Non high-tech Manufacturing	Chi square test
Laforet, 2013	Relationship between firm size and innovation financial outcome	Positive relationship	Profit margin	Number of employees	Multi sector	Regression analysis
Wakasugi & Koyata, 1997	Elasticity of patent applications (innovation input) and product development to firm size	No relationship	Number of product developments and patent applications	Number of employees	Electrical Machinery firms	Estimation
Laforet & Tann, 2006	Relationship between size and innovativeness	No relationship	Innovativeness: DTI/CBI report: number of new products idea, new products, ...	-	Manufacturing	-
Salavou, Baltas, & Lioukas, 2004	Relationship between organisational innovation and firm size	A negative relationship	Number of adopted new products	Number of employees	Manufacturing	Regression

Table 2. Literature on organisational age and innovation

Reference	Focus	Relationship	Measure of innovation	Measure of Age	Sector	Method
Avermaete <i>et al</i> , 2003b	Impact of age on innovativeness	No relationship	Adoption of product innovation, process innovation, ISO, organic food, R&D expenditure...	Time since establishment	Food	t-test and Chi-Square
Laforet, 2013	Relationship between age and financial innovation outcome	No relationship	Profit margin and market share	-	Multi sector	Regression analysis
Laforet & Tann, 2006	Relationship between age and innovativeness	No relationship	Innovativeness: DTI/CBI report: number of new products idea, new products, ...	-	Manufacturing	-
Huergo & Jaumandreu, 2004b	Relationship between product and process innovation and age	The relationship is nonlinear	Introduction of new production process	Time since establishment	Manufacturing	Estimation
Rosenbusch <i>et al.</i> , 2011	Impact of firm age and the innovation-Performance relationship	Negative impact	Innovation orientation, innovation input and output...	Classification: new; established		Meta analysis
Sørensen and Stuart, 2000	Effect of firm age on innovation activity	Positive relationship between age and generation of innovation	Patenting rate	Time since establishment	Semi conductors and Biotechnology	Cox Model
Winters and Stam, 2007	Effect of firm age on product and process innovation	Positive relationship between firm age and product innovation but no significant relationship with process innovation	<i>Product innovation:</i> development of at least one product innovation <i>Process innovation:</i> development of at least one process	Time since establishment	High Tech SMEs	Logistic Regression

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For Peer Review

Table 3. Position and Paradigm Innovation Constructs

<i>Construct</i>	<i>Item</i>	<i>Source</i>
Position		
	Position1: engagement with incremental position innovation	Francis and Bessant (2005)
	Position2: engagement with radical position innovation	Francis and Bessant (2005)
	Position3: level of resource allocation to position innovation.	Van de Ven (1999), Cooper and Edgett (2010), Siguaw <i>et al</i> (2006)
	Position4: engagement with branding.	Doyle (1995), Doyle (2000), Francis and Bessant (2005)
	Position5: engagement with marketing and promotions.	Doyle (1995), Doyle (2000), Francis and Bessant (2005)
	Position6: awareness of advantages of e-marketing.	Whyte <i>et al</i> (2005), Francis and Bessant (2005)
	Position7: exploitation of CRM.	Homburg <i>et al</i> (2000), Fuglsang (2008), Ko <i>et al</i> (2008)
Paradigm		
	Paradigm1: engagement with incremental paradigm innovation	Francis and Bessant (2005), Tidd <i>et al</i> (2005)
	Paradigm2: engagement with radical paradigm innovation	Francis and Bessant (2005), Tidd <i>et al</i> (2005)
	Paradigm3: level of resource allocation to paradigm innovation	Van de Ven (1999), Siguaw <i>et al</i> (2006), Chesbrough (2007)
	Paradigm4: analysis of existing strategies and business models	Francis and Bessant (2005), Tidd <i>et al</i> (2005)
	Paradigm5: level of firm engagement with partnering and strategic alliances	Francis and Bessant (2005), Trimi and Berbegal-Mirabent (2012)
	Paradigm6: level of firm engagement with outsourcing, and mergers or acquisitions	Francis and Bessant (2005), Trimi and Berbegal-Mirabent (2012)

Table 4. Construct Reliability Estimates and Measurement Loadings

<i>Code</i>	<i>Construct / Item</i>	<i>Mean</i>	<i>SD</i>	<i>Standardized Loadings</i>
POSITION INNOVATION (Reliability = 0.91)				
Position1	Incremental Position Innovation	3.9	1.18	0.77*
Position2	Radical Position Innovation	3.5	1.22	0.78*
Position3	Resource Position Innovation	3.2	1.25	0.87*
Position4	Branding	3.3	1.33	0.90*
Position5	Promotions	3.4	1.29	0.88*
Position6	e-Marketing	3.5	1.41	0.74*
Position7	CRM	2.6	1.40	0.80*
PARADIGM INNOVATION (Reliability = 0.89)				
Paradigm1	Incremental Paradigm Innovation	3.8	1.08	0.80*
Paradigm2	Radical Paradigm Innovation	2.9	1.22	0.86*
Paradigm3	Resource Paradigm Innovation	3.0	1.17	0.86*
Paradigm4	Business Model	3.4	1.20	0.87*
Paradigm5	Partnering and Alliances	2.9	1.28	0.74*
Paradigm6	Mergers and Acquisitions	2.5	1.34	0.65*

*All coefficients were significant $p < 0.001$

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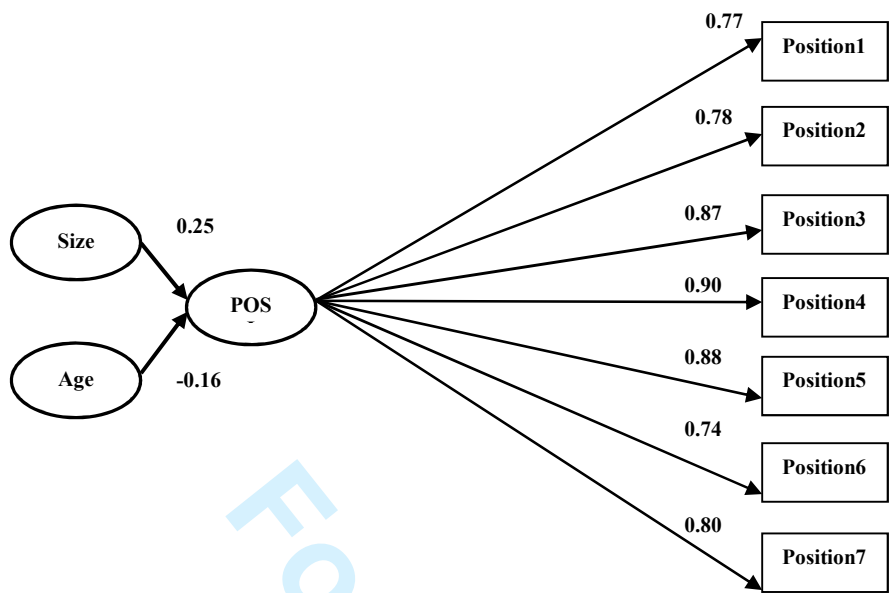


Figure 1 Structural equation model representing the relationship between organizational size and age on position innovation

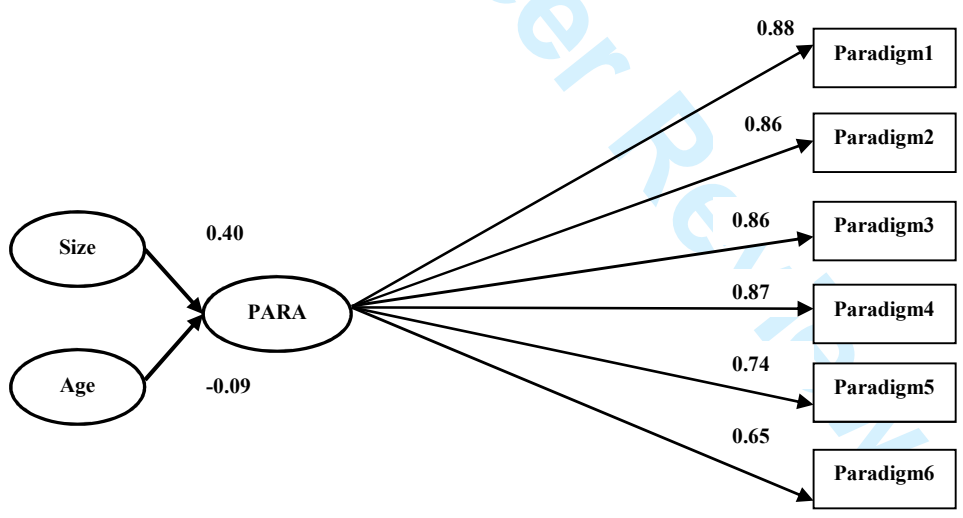


Figure 2. Structural equation model representing the relationship between organizational size and age on paradigm innovation.