

A SYSTEMS APPROACH TO STRENGTHENING CORPORATE ENTREPRENEURSHIP ACTIONS

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ARTICLE INFO

Article details

Presented at the 2nd International Conference on Industrial Engineering, Systems Engineering and Engineering Management, held from 2 to 4 October 2023 in Somerset West, South Africa

Available online 17 Nov 2023

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DOI

<http://dx.doi.org//10.7166/34-3-2947>

ABSTRACT

Corporate entrepreneurial activities need to be aligned extensively with a company's strategy. This study offers a systems approach to linking a company's strategy with corporate entrepreneurship through IDEF0 modelling. The IDEF0 model provides the framework from which enabling and controlling mechanisms are derived. The objective of the investigation is to identify areas within the organisational structure of a company (both vertical and horizontal) where the enabling mechanisms of corporate entrepreneurial actions are prevalent and areas where they are lacking. The research also aims to identify areas where the controlling mechanisms of corporate entrepreneurial actions might be lacking or overbearing. The results show that the engineering support department had a higher proclivity for corporate entrepreneurial activities, while the projects department had a lower proclivity for corporate entrepreneurship. The results also show that the higher the position of a person in the company hierarchy, the higher the proclivity for corporate entrepreneurship.

OPSOMMING

Korporatiewe entrepreneuriese aktiwiteite moet breedvoerig belynd word met 'n maatskappy se strategie. Hierdie studie bied 'n stelselbenadering om 'n maatskappy se strategie met korporatiewe entrepreneurskap te koppel deur IDEF0-modellering. Die IDEF0-model verskaf 'n raamwerk waaruit bemagtigings- en beheermeganismes afgelei kan word. Die doel van die ondersoek is om areas binne die organisasiestruktuur van 'n maatskappy (beide vertikaal en horisontaal) te identifiseer waar die bemagtigende meganismes van korporatiewe entrepreneursaksies algemeen voorkom, asook areas waar dit ontbreek. Die navorsing het ook ten doel gehad om gebiede te identifiseer waar die beheermeganismes van korporatiewe entrepreneuriese moontlik ontbreek of aanmatigend is. Die resultate wat verkry is, het getoon dat die ingenieursondersteuningsdepartement 'n hoër geneigdheid vir korporatiewe entrepreneuriese aktiwiteite gehad het, terwyl die projekafdelings 'n laer geneigdheid vir korporatiewe entrepreneurskap gehad het. Die resultate het ook getoon dat hoe hoër die posisie van 'n persoon in die maatskappyhiërargie is, hoe groter is die geneigdheid vir korporatiewe entrepreneurskap.

1. INTRODUCTION

The scope of the corporate entrepreneurship (CE) domain has expanded quite significantly over the past 40 years [1]. Although companies today realise the importance of entrepreneurial activities in promoting innovation, the field was seen in the 1980s as just another managerial fad. These doubts were amplified by the large amount of anecdotal evidence that was available at the time; but this changed after Zahra's exploratory study [2] on the financial outcomes of CE and the proactive response to environmental changes it provides. The study of general entrepreneurship has traditionally focused purely on recognising opportunities and the process of transforming those opportunities into new products or services for a

company [3]. However, recent research has identified the need for CE to be aligned with a company's long-term objectives and strategy. Kuratko [4] suggests that developing a strategy that promotes CE provides numerous advantages: these strategies have a deep impact on the culture of an organisation, such that a positive atmosphere created in the workplace often leads to new products and services, and is instrumental in helping the company to grow and expand; by implementing corporate entrepreneurial attitudes, an organisation creates a workforce that actively helps the company to maintain its competitive superiority; and it promotes a high-performance culture in which high achievers are rewarded and motivated to stay in the company.

Corporate entrepreneurship (CE) could improve a company's competitive standing by modifying internal processes, structures, and capabilities [5]. Organisations whose managers are adept at applying CE principles are usually viewed by competitors as dynamic and flexible, because such companies constantly seek to exploit new opportunities, because such companies constantly seek to exploit new opportunities [6]. At its core, CE is the process through which opportunities in the internal or external environment are leveraged by the corporate entrepreneur to gain new markets, improve current product-market relationships, or improve business processes throughout the organisational structure.

The rationale of this research is to investigate whether there are differences between the enabling antecedents and controls of CE across the different departments (horizontal) and hierarchies (vertical) of an organisational structure. This is done to identify areas in the organisational structure that are ready for CE.

The objective of this research is to identify the areas within the organisational structure of a company (both vertical and horizontal) where the enabling mechanisms of corporate entrepreneurial actions are prevalent, and those areas where they are lacking. The research identifies areas where the limiting mechanisms of corporate entrepreneurial actions might be either lacking or overbearing.

The following research questions (RQ) are asked in order to achieve this objective:

RQ1 - To what extent are the enabling mechanisms/ antecedents of CE experienced differently throughout the organisational structure (both departmental and hierarchical) of a company?

RQ2 - To what extent are the controlling mechanisms of CE experienced differently throughout the organisational structure (both departmental and hierarchical) of a company?

2. THEORETICAL FRAMEWORK AND HYPOTHESES

The success of CE depends on multiple interrelated factors, and CE does not automatically produce positive results. Companies have made the erroneous assumption that, by implementing corporate entrepreneurial initiatives, these will always lead to increased profits. However, most researchers agree that, for CE to be successful, it must be aligned with the company's strategy and be a source of sustainable competitive advantage [7], [8]. It is important, therefore, that managers understand the strategic relevance of all entrepreneurial actions that are initiated throughout the organisation, and ensure that they will lead to a sustainable competitive advantage. Although previous studies have stressed the importance of CE being aligned with a company's strategy, no systems approach was found in which CE was linked to a company's strategy.

2.1. Systems approach - IDEF0 modelling

One of the most useful tools to be developed in the field of systems engineering is the integration definition for functional modelling (IDEF), which was developed by the US Air Force in the 1980s [9]. The first of these standards was the IDEF0 modelling tool, which focused on the functional analysis of business or production processes. The tool is useful for analysing decisions, activities, or actions in a defined system, which could then assist the modeller in identifying the functions that were needed and how these functions could be integrated within the company [10]. The result is a graphical representation, with specific syntax, shown in Figure 1.

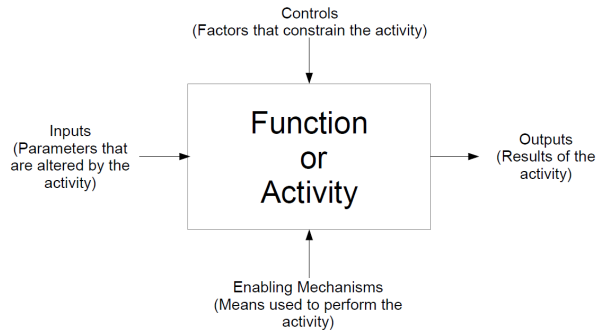


Figure 1: IDEF0 syntax (adapted from [10])

In Figure 1 the syntax used in IDEF0 modelling is shown. The main activity or function is represented by a block diagram. The left arrow represents the **inputs** into the activity - those parameters that will be altered and processed by the function or activity. The right arrow is the **outputs** - the results of the input being altered by the activity. The top arrow represents those factors that **control** or constrain the activity or function, while the bottom arrow represents the **enabling** mechanism that is used to perform the activity.

2.2. Inputs

In the process of strategy development, the inputs are usually information on the current state of substantive capabilities that the company has, and how they are integrated throughout. Dynamic capability is widely contrasted with ordinary or substantive capabilities by the association of the former with change [11]. During strategic development, the senior managers of a company will choose to add or dispose of its substantive capabilities or change the way in which they are integrated throughout the company. This 'ability to change capabilities' - owing to changing market demands or a changing technological landscape - is also widely attributed to providing competitive advantage to organisations in developing strategies [12], learning new skills [13], and commercialising technologies developed by the company's own research and development department [14].

2.2.1. Outputs

In strategic management, one of the goals is to determine how the company's resource base should be managed in the context of business and market needs [15]. It is advantageous for a company to manage its resources in such a way that competitors find it difficult to imitate the synthesis that is achieved after a good strategy has been developed. This synthesis is achieved by aligning all of the functions in a company in order to gain a sustainable competitive advantage - the ultimate goal in strategy development - and can be seen as the output in the development of a company's corporate strategy.

2.2.2. Enabling mechanisms

In developing a corporate strategy, the company needs a set of capabilities that enable it to respond to changes in the environment. Owing to the increasingly dynamic nature of the marketplace, there is a need for strategy development also to be dynamic [16], such that specific capabilities are assessed to determine whether they enable the creation of a sustainable competitive advantage [17]. Innovation has always been closely associated with dynamic capabilities, because innovation usually changes the core or substantive capabilities of an organisation [18].

2.2.3. Control and constraints

The way in which the top management of a company approaches the development of its corporate strategy has changed over time [7], [19]. The types of strategy that were developed by companies in the 1980s were formal and rigid [20] - a result of companies' desire to obtain and sustain stability rather than a competitive advantage. As the volatility of the business environment increased, formal and rigid strategies were no longer an appropriate way to achieve the company's goals. Both external and internal business environments influence how management approaches strategy development [21], and so have a moderating or controlling impact on the way in which a company develops its corporate strategy.

2.3. Adopting CE as a strategy

In this section, a systems perspective of CE is followed by representing the CE process as an IDEF0 diagram with inputs, outputs, controls, and supporting mechanisms, as seen in Figure 2.

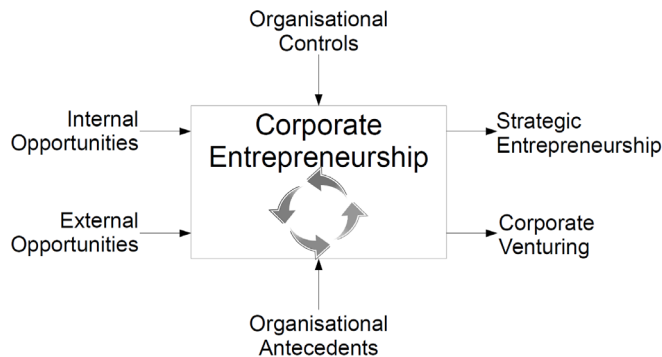


Figure 2: A systems view of CE

2.3.1. Opportunities

At its core, CE seeks to transform opportunities into implemented initiatives that give the company a sustainable competitive advantage over its competitors [1]. An ‘opportunity’ has been defined as a “potentially lucrative idea that is discovered by an entrepreneurial entity” [22]. Opportunities can be either internal or external to the organisation; and it is the task of the corporate entrepreneur to identify and develop these opportunities into viable initiatives. Internal opportunities are transformed into improved processes (both business and physical) within the organisation, and as such are sometimes associated with strategic CE [8].

2.3.2. Domains: Corporate venture and strategic CE

When CE is studied in the organisational setting, it is useful to discern the major domains or categories within CE. Morris *et al.* [6] describe two constructs as constituting the domains of CE. The first is strategic CE, which drives changes in the organisation’s existing capabilities, organisational structures, or business processes [23]. These elements are grouped together in Figure 2 as ‘strategic CE’, and can be seen as one of the major outputs of the CE process. The second major domain of CE is corporate venturing (Figure 2), which drives changes in the market breadth of the organisation by adding new businesses [23]. The focus of this article is on strategic CE.

2.3.3. Organisational antecedents

Research into the organisational antecedents for CE has progressed significantly over the past two decades. Hornsby *et al.* [24] developed the first comprehensive tool to assess an organisation’s readiness for CE, namely the CE assessment instrument (CEAI). Numerous studies have validated this instrument [25], [26], and therefore the antecedents of CE have been treated in this investigation as fully developed. The CEAI classifies five broad antecedents to enable the CE process. These antecedents are specifically focused on perceptions within the organisation, and are defined below:

- Top management support: the extent to which employees perceive that top management is promoting and facilitating entrepreneurial activities in the organisation. Support from top management has a directly positive effect on the organisation’s CE activities.
- Work discretion: the extent to which employees perceive that the organisation tolerates failure and offers freedom from excessive oversight. It is also important that responsibilities are delegated to lower-level managers, as most identified opportunities originate from employees who have a high level of discretion about how they perform their work.

- Rewards and reinforcement: the perception of the employees that entrepreneurial activities are promoted through the company's reward systems. Systems that are designed to encourage risk-taking behaviour have been shown to increase CE in an organisation.
- Time availability: the perception in the organisation that employees' work load and schedules allow for exploratory activities in the pursuit of opportunities for further development.
- Organisational boundaries: the extent to which employees perceive that there are flexible organisational boundaries such that information and entrepreneurial activities can flow from the external environment as well as between departments in the organisation [26].

The CEAI provides researchers with a practical tool for assessing the internal environment of an organisation, and the extent to which the environment promotes entrepreneurial activities. It is important to note that the CEAI captures internal phenomena that are psychological in nature and are best described by the employees who experience them [25]. The antecedents listed above would lead to increased entrepreneurial activity, but would not necessarily create a competitive advantage owing to the need for strategic controls that moderate the freedom-inducing antecedents [27].

2.3.4. Organisational controls

If a company simply lets employees implement CE without any restrictions, then the CE practised by those employees might be harmful to the company. Organisational control systems can be either an important inhibitor or a facilitator of the development of a company's strategy. CE and organisational controls may at first seem to be inherently at odds with each other [28], because CE aims to change capabilities in the organisation while organisational controls aim to stabilise capabilities [27]. However, when CE is pursued without organisational controls, the specific entrepreneurial activities may not be aligned with the company's strategy, and could actually be detrimental to the firm's performance. Controls are therefore intended to keep all CE activities aligned with the company's overall strategy. Goodale et al. [28] suggest that two organisational control elements be considered when aligning CE activities with the company's strategy: risk control and process formality control. These organisational controls should be applied to the antecedents in order to moderate any adverse effects on the company and to direct the strategy.

2.4. Development of hypotheses

2.4.1. Vertical and horizontal analysis of CE in the organisational structure

The organisational structure will define how different parts of the organisation relate to one another and how they align with the company's overall strategy. The model presented in Figure 2 includes the inputs, outputs, and controlling and enabling mechanisms of CE. The focus here was only on the controlling and enabling mechanisms of CE, not on the inputs and outputs. The organisational structure of a company was analysed to see whether there were areas where the enabling and the controlling mechanisms were prevalent to a greater or lesser extent. Unlike previous research, this study did not attempt to find a balance per se, but rather looked at the controlling and enabling mechanisms separately across the organisational structure of a company.

In order to analyse properly the antecedents and controlling mechanisms of CE across the organisational structure, different views of the organisational structure were analysed, namely a horizontal and a vertical view. The vertical view of the organisational structure focused on the different roles across the reporting structure of a company, and was defined as different hierarchical roles that employees fulfil in the organisation. The hierarchical roles started from the bottom i.e., with those employees who did not have any subordinates who report to them. Then two layers above this bottom hierarchical level were analysed. The horizontal view of the organisation focused on the different functional roles across the organisation. These functional roles were grouped into different departments in the company. This study attempted to categorise the departments in a way that was comparable with other engineering-intensive industries. These departments were production, engineering, projects, logistics, along with other departments.

2.4.2. Differences in the experiences of enabling mechanisms/antecedents

In order to investigate RQ1, two hypotheses were posited with corresponding sub-hypotheses. The first hypothesis, H1, investigated whether there were differences in the enabling mechanisms across the departmental structure of a company. The departments were treated as the independent variables in the analysis of this hypothesis. Hypotheses H1-1 to H1-5 explored the specific antecedents as dependent variables with regard to the departmental independent variables. This can be seen in Table 1.

Table 1: Hypothesis H1 and sub-hypotheses H1-1 to H1-5, to partly answer RQ1

Hypothesis	Description
H1	The enabling mechanisms/antecedents of CE are experienced differently throughout departments of an organisation.
H1-1	The experiences of top management support are statistically different among departments.
H1-2	The experiences of work discretion are statistically different among departments.
H1-3	The experiences of rewards and reinforcement are statistically different among departments.
H1-4	The experiences of time availability are statistically different among departments.
H1-5	The experiences of organisational boundaries are statistically different among departments.

The second hypothesis, H2, investigated whether there were differences in the enabling mechanisms across the hierarchical structure of a company. The hierarchies were treated as the independent variables in the analysis of this hypothesis. The sub-hypotheses H2-1 to H2-5 explored the specific antecedents as dependent variables with regard to the hierarchical independent variables; see Table 2.

Table 2: Hypothesis H2 and sub-hypotheses H2-1 to H2-5, to partly answer RQ1

Hypothesis	Description
H2	The enabling mechanisms/antecedents of CE are experienced differently throughout the hierarchy of an organisation
H2-1	The experiences of top management support are statistically different among hierarchies.
H2-2	The experiences of work discretion are statistically different among hierarchies.
H2-3	The experiences of rewards and reinforcement are statistically different among hierarchies.
H2-4	The experiences of time availability are statistically different among hierarchies.
H2-5	The experiences of organisational boundaries are statistically different among hierarchies.

2.4.3. Differences in the experiences of limiting / control mechanisms

In order to investigate RQ2, two hypotheses were posited with corresponding sub-hypotheses. The first hypothesis to answer RQ2, H3, investigated whether there were differences in the limiting/controlling mechanisms across the departmental structure of a company. The departments of the organisation were treated as the independent variables in the analysis of this hypothesis. Hypotheses H3-1 to H3-2 explored the specific controls as dependent variables with regard to the departmental independent variables; see Table 3.

Table 3: Hypothesis H3 and sub-hypotheses H3-1 to H3-2, to partly answer RQ2

Hypothesis	Description
H3	The limiting/controlling mechanisms of CE are experienced differently throughout the departments of an organisation
H3-1	The experiences of risk control are statistically different among departments.
H3-2	The experiences of process formality are statistically different among departments.

The second hypothesis to answer RQ2, H4, investigated whether there were differences in the limiting/controlling mechanisms across the hierarchical structure of a company. The hierarchies of the organisation were treated as the independent variables in the analysis of this hypothesis. Hypotheses H3-1 to H3-2 explored the specific controls as dependent variables with regard to the departmental independent variables; see Table 4.

Table 4: Hypothesis H4 and sub-hypotheses H4-1 to H4-2, to partly answer RQ2

Hypothesis	Description
H4	The limiting/controlling mechanisms of CE are experienced differently throughout the hierarchy of an organisation
H4-1	The experiences of risk control are statistically different among hierarchies.
H4-2	The experiences of process formality are statistically different among hierarchies.

3. RESEARCH METHODOLOGY

3.1. Research design

The research design of this investigation predominantly followed a quantitative approach in order to answer the research questions, because the constructs of the research questions have already been well defined in the literature study. The objective did not indicate that this investigation attempted to make a planned intervention in the sample that was analysed; therefore, it did not follow the experimental or quasi-experimental research design routes. Rather, a non-experimental research design involving measurements at a single timeframe was followed. Although triangulation is usually not necessary when doing purely quantitative data analysis, this research focused on criterion-group independent variables that could co-vary; so it attempted to triangulate the results that were obtained by using both qualitative and quantitative research design methods. It must be stressed that the quantitative methods were the primary method used in this article to analyse the research questions. The company that was chosen for the study was an international petrochemical company, with multiple business units operating mostly independently from the parent company. At the time of the study, the company had operations in seven countries.

3.2. Variables and statistical techniques

This study aimed to investigate the differences of the dependent variables (controls and antecedents) across two independent variables, namely the departmental and hierarchical structure of a company. Therefore, this research could be more accurately described as adopting a criterion-group non-experimental research design [29]. Respondents were given the following hierarchical independent variables from which to choose: (i) team member; (ii) team leader; and (iii) functional leader.

Respondents were given the following departmental independent variables from which to choose: (i) engineering support to production; (ii) financial; (iii) logistics and supply chain support; (iv); production; (v) projects; and (vi) other (please specify).

The distribution of both of these independent variables was analysed to determine whether any respondents should be discarded. Particular attention was paid to the departmental independent variable's 'other' category, in order to identify additional categories or to merge existing categories.

As can be seen in Figure 3, the corporate entrepreneurial assessment instrument (CEAI) was used to measure the five specific antecedents of CE, namely top management support, work discretion, rewards and reinforcement, time availability, and organisational boundaries. These five categories constituted the enabling dependent variables in order to answer RQ1. The enabling dependent variables measured through the CEAI were first ranked (using a five-point Likert scale of agreement) across the departments of the organisation in order to test H1. Then the enabling dependent variables were ranked across the hierarchical structure of the company to test H2.

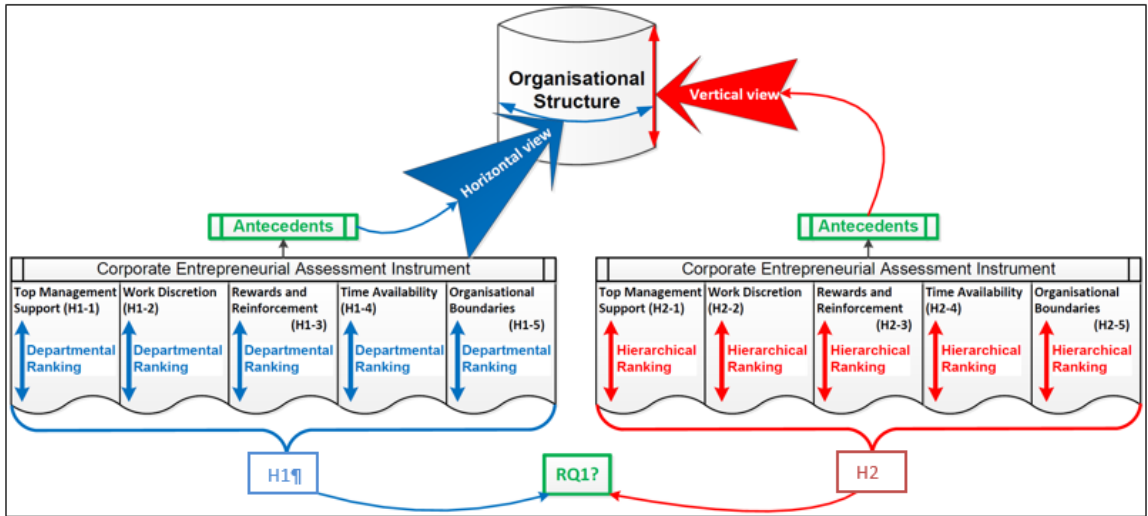


Figure 3: Research methodology to answer RQ1

As can be seen in Figure 4, the control scales developed by [28] were used to measure the two specific controls of CE, namely risk and process formality. These two categories constituted the controlling dependent variables in order to answer RQ2. The control dependent variables were first ranked across the departments of the organisation in order to test H3. Then those variables were ranked across the hierarchical structure of the company to test H4. Before any data was gathered, an ethical clearance process was followed, in which the questions were first presented to the senior management of the target organisation, and then approval was obtained from both that senior management and the ethics committee of the university.

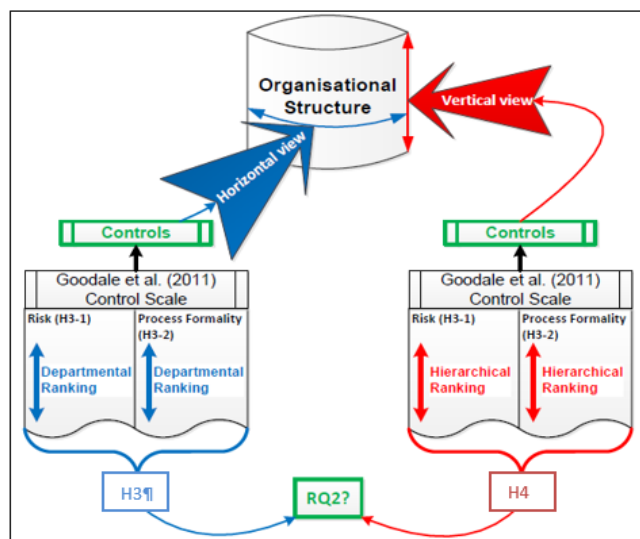


Figure 4: Research methodology to answer RQ2

In order to answer the research questions by examining any differences among the mean values of various groups (i.e., between the departmental and hierarchical levels), a one-way ANOVA (analysis of variation) was performed for each of the five specific antecedents of CE and the two controls of CE. The null hypothesis in ANOVA indicates that there is no difference in the mean values; and the research (or alternative) hypothesis is that the mean values are not all equal. An F-value for each dependent variable is determined and, if it is greater than the critical F-value, then the null hypothesis is rejected (in other words, there are differences between the groups). In order to determine which pairs of groups have significant differences, Tukey-Kramer (for unequal group sizes) is used as a post hoc test.

4. RESULTS AND DISCUSSION

A total of 412 possible respondents were contacted to complete the online survey, of whom 250 did so, representing a response rate of 60.7%. A process of re-categorisation of the initial departmental categories was followed because of the initial mal-distribution of the data. The ‘other’ option was analysed in order to decide on modified categories. The modified department names and abbreviations that were used were as follows:

- i. Production
- ii. Engineering support (Eng support)
- iii. Projects
- iv. Administration (Admin)
- v. Safety, health and environment (SHE)
- vi. Research and development (R&D)

The hierarchical categories were left unchanged. Because some respondents did not answer some questions, a total of 32 responses were rejected and did not form part of the statistical analysis.

The internal consistency of each dependent variable was calculated using the statistical parameter Cronbach’s alpha, and was sorted according to the different departments and hierarchical levels. Cronbach’s alpha tests whether multiple questions actually measure the same underlying principle. It can be seen either as a measure of how well the questions were posited in order to measure the relevant dependent variable, or as a measure of how well the respondents understood the questions. If the result of Cronbach’s alpha is above 0.7, then the internal consistency of the data in that category is high. The internal consistency of the dependent variables showing Cronbach’s alpha of less than 0.7 for the departments and hierarchy was that for time availability and for organisational boundaries. It was decided to exclude all internally inconsistent results from the hypothesis testing (time availability [H1-4 and H2-4] and organisational boundaries [H1-5 and H2-5]), as no valid conclusions from these results could be drawn.

4.1. Quantitative results

The critical F-value at the 0.05 significant level was 2.26 for departments (i.e., $F(5,250)$) and 3.04 for hierarchy (i.e., $F(2,250)$). The highlighted values in Table 5 indicate the F-values with significance for each dependent variable. There were differences in top management support and in work discretion among the groups under departments and hierarchy. The group differences for reward and reinforcement and for risk control only appear under hierarchy.

Table 5: F-values of ANOVA

		ANOVA	
		Departments	Hierarchical levels
Organisational antecedents	Top management support	3.827	7.802
	Work discretion	5.667	4.407
	Reward and Reinforcement	0.509	5.612
Organisational controls	Risk control	0.489	3.669
	Process formality	0.320	0.568

Concerning the post hoc test, which was done to determine which pair of groups had the differences, the results of the Tukey-Kramer are provided in Table 6 for groups under departments and under hierarchy. Only the results with significant differences at a p-value of 0.05 are shown.

In the departments, only two organisational antecedents showed group differences (see Table 5). The post hoc test results in Table 6 show that, for top management support, the engineering support department had most of the differences (higher) from the projects department, whereas for the work discretion antecedent, the engineering support department had differences (higher) from three other departments (R&D, projects, production). The admin department had higher scores in work discretion than the projects department.

Under hierarchy, three antecedents - namely top management support, work discretion, and reward and reinforcement - and one control had group differences; see Table 5. As shown in Table 6, for the reward and reinforcement antecedent, the functional leader group scored higher than the team member group, whereas for the other two organisational antecedents (top management support and work discretion), the functional leader group scored higher than both of the other groups (team leader and team member). The team leader and team member groups had no difference from each other in top management support and work discretion. For organisational controls - namely risk control - the functional leader group scored higher than the team leader and team member groups. The team leader and team member groups also had no differences between them, similar to what was found for the antecedents.

Table 6: Results of Tukey-Kramer for departments and hierarchy

Dependent variable	(I) Department	(J) Department	Mean difference (I-J)
Top management support	Eng support	Projects	0.53346*
Work discretion	Eng support	R&D	0.50798*
		Projects	0.47351*
	Admin	Projects	0.46228*
Top management support	Functional leader	Team member	0.57605*
		Team leader	0.54818*
Work discretion	Functional leader	Team member	0.42063*
		Team leader	0.39382*
Reward and reinforcement	Functional leader	Team member	0.38451*
Risk control	Functional leader	Team member	0.47785*
		Team leader	0.60163*
		Team member	0.50991*

*: $p < 0.05$

Hypothesis 1 stated that the enabling mechanisms/antecedents of CE would be experienced differently throughout the departments of an organisation. Five hypotheses were originally posited, of which two were positive, namely H1-1 and H1-2.

Hypothesis 2 stated that the enabling mechanisms/antecedents of CE would be experienced differently throughout the hierarchy of an organisation. Five hypotheses were originally posited, of which three were positive, namely H2-1, H2-2, and H2-3.

Hypothesis 3 stated that the limiting/controlling mechanisms of CE would be experienced differently throughout the departments of an organisation. Two hypotheses were originally posited to support this

statement. Although both hypotheses were internally consistent, both were discarded through null-hypothesis testing. Therefore, no analysis was possible with regard to Hypothesis 3.

Hypothesis 4 stated that the limiting/ controlling mechanisms of CE would be experienced differently throughout the hierarchy of an organisation. Two hypotheses were originally posited to support this statement. Although both were internally consistent, process formality was discarded through null-hypothesis testing, and risk control was found to be positive.

4.2. Qualitative results

Only those variables that co-varied across both independent variables were qualitatively analysed further by means of a focus group study. As can be seen in Table 6, only top management support and work discretion co-varied across both independent variables, namely the departmental and hierarchical structure of a company. Therefore, the focus group study explored the qualitative reasons for the results obtained in those areas.

From the departmental results for top management and work discretion, it was decided to construct the focus group from one department that had a high ranking in both of the antecedents (engineering support department - eight people) and from one department that had a low ranking in both antecedents (projects department - nine people). The results of the hypothesis testing were not shared with the focus group to prevent confirmation bias.

The two departments were initially separated and asked to brainstorm among themselves on how their departments could improve learning opportunities and/or to list the best practices related to the two antecedents. According to the projects department, top management support could be enhanced by the early involvement of senior managers in supporting ideas and communicating business risks, and by less control by senior managers in the front-end loading phase of projects; whereas the engineering support department indicated the need for senior managers to communicate strategic innovation needs more clearly. With regard to work discretion, the projects department indicated the need for a simpler peer review process, less strict governance, and no duplication of duties that led to confusion of roles. According to the engineering support department, opportunities should be recognised during regular process monitoring, and operational changes should require less governance. The projects department had more issues that they felt needed to be addressed, while the engineering support department identified areas in which they could offer learning opportunities to the other departments.

5. CONCLUSIONS AND RECOMMENDATIONS

The first research question (RQ1) asked about the extent to which the enabling mechanisms/antecedents of CE are experienced differently throughout the organisational structure (both departmental and hierarchical) of a company. For top management support, the engineering support department perceived that experiences of these CE antecedents were higher than those for the projects department. The other antecedent that showed differences was work discretion, where the engineering support department's perceived experiences scored higher than those of the other three departments (R&D, projects, and production) and the admin department's perceived experiences scored higher than those of the projects department. In summary, the engineering support department's perceived experience was the highest in respect of top management support and work discretion (thus supporting hypotheses H1-1 and H1-2).

In each of the CE antecedents for the hierarchical independent variables, it should be noted that the functional leaders were defined simply as managers who manage other managers; they did not constitute top management. Therefore, the study attempted to measure only the perceived support of top management from the viewpoint of functional leaders. The functional leaders' perceived experiences were significantly higher across the CE antecedents top management support, work discretion, and reward and reinforcement (thus supporting hypotheses H2-1 to H2-3). However, there were no differences between team members and team leaders in any of the antecedents. To answer RQ1, the engineering support department and the functional leaders were the two groups in the organisation with the highest perceived experience of two and three CE antecedents respectively. The results showed that the engineering support department had a higher tendency for corporate entrepreneurial activities than the projects department. The results also showed that the higher the position of a person in the organisation's hierarchy, the higher their inclination for corporate entrepreneurship.

The second research question (RQ2) asked about the extent to which the controlling mechanisms of CE are experienced differently throughout the organisational structure (both departmental and hierarchical) of a company. No statistically significant results could be obtained for the controls across the departmental structure of the company. For the hierarchical structure of the company, the only controlling mechanism that was statistically significant was risk control. The functional leaders had the most perceived experience in risk control when compared with the team leaders and the team members. There was no significant difference between the team leaders and the team members. Thus Hypothesis 4-1 was supported.

Because Hypothesis 3 was rejected (i.e., there were no differences between the departments), and because only the risk control variable for Hypothesis H4-1 could be supported, it is proposed that a better process formality be developed for future use. It is also recommended that the CEAI be reassessed for the variables time availability and organisational boundaries, because no internally consistent results could be obtained from these variables. It would also be helpful, once a proper control scale has been developed, that the balance between the enabling and controlling mechanisms be correlated.

The main limitation of the study was that it was done with a single company. This was partly mitigated by the fact that the company in question operated in seven countries, with a multitude of business units that mostly operated independently from the parent company.

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