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THE ADOPTION OF MANAGEMENT CONTROLS FROM A COMPLEX ADAPTIVE SYSTEMS PERSPECTIVE

Abstract:

The purpose of this paper is to investigate whether self-organisation predicts of adoption of management controls in manufacturing firms. The study employed the lens of complex adaptive systems theory to investigate the research question. The study used a cross-sectional survey to collect data from 202 manufacturing firms with the use of a multi-dimensional self-administered questionnaire

Data were analyzed quantitatively using PLS-SEM. The findings indicate a positive relationship between innovativeness, emergence and adoption of management controls. The hypothesis for networks of interaction was not supported.

Keywords:

Management control; Adoption; complex adaptive systems

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Introduction

Management control adoptions are regarded as important, often beneficial, choices by a manufacturing firm's management, because they play a significant role in ensuring their financial viability [1]. For businesses to survive, they need to quickly identify new threats and opportunities, make decisions about their response and implement these decisions quickly [2]. Nevertheless, although some organizations use extensive, formal planning practices or incorporate formal rules, procedures and standards, other firms have been found to rely more on individual judgment [2] and many start-ups choose not to adopt MCs at all [3]. Therefore, understanding the emergence of MC's is important to managing firms [4].

6 This study departs from previous studies that employed structural contingency theory variables, such as firm size, age, technology, structure, and strategy [5] to explain the adoption of management controls from a complex adaptive systems (CAS) perspective because CAS models explicitly recognise the importance of human interactions during the adoption of management controls [7] [8]. A complex adaptive system consists of a number of heterogeneous agents (employees), and each of those agents makes decisions about how to behave. The agents interact with one another, leading to the emergence of management controls: In a very real way, the whole becomes greater than the sum of the parts. The key issue is that you can't really understand the whole system by simply looking at its individual parts [6].

Complex adaptive systems theory is a theory of change, evolution, adaptation and development for survival [7]. At the heart of complex adaptive systems theory lies self-organisation which is the process by which agents in a system interact, exchange information, mutually affect one another, according to their own local rules of behaviour and, in doing so, generate new behaviour in the system, as a whole [8]. Extending complex adaptive systems theory to studying the adoption of management controls is promising, because of its focus on understanding relationships between and among individuals and the resulting collective behaviours and outcomes [9].

Application of a CAS perspective, by including self-organisation as a construct, may provide a better theoretical explanation, than a contingency framework, in identifying the different processes involved in the adoption of management controls for three reasons. First, the notion that society is a "marketplace of ideas" is commonplace, but models of organizations in which knowledge structures compete with one another and evolve are rare. The CAS perspective explores how ideas, initiatives, and interpretations form an internal ecology within an organization. Secondly, CAS models represent a genuinely new way of simplifying the complex, of encoding natural systems into formal systems. Instead of making nonlinear systems tractable by reducing them to a set of causal variables and an error term, CAS models typically show how complex outcomes flow from simple schemata and depend on the way in which agents are interconnected. Thirdly, agents in CAS models need not be the prisoners of a fixed set

of rules. Complex adaptive systems encode their environments into many schemata that compete against one another internally. Evolving actors develop vicarious selective systems so that they can experiment and fail without being killed; they allow schemata to compete and reinforce those that seem to be associated with favourable outcomes [10].

In line with this perspective, the aim of this paper is to establish whether self-organisation leads to the adoption of management controls. This is achieved through a quantitative cross-sectional survey of 202 large manufacturing firms. Analysis of the data using PLS-SEM indicates that, of the dimensions of self-organisation, emergence has the largest effect on adoption of management controls, followed by innovativeness. However, the effect of networks of interaction on adoption of management controls, is insignificant. It thus improves on our understanding of the adoption of management controls in a dynamic environment, from a complex adaptive systems perspective.

The rest of the paper proceeds as follows: Section 2 is a brief description of the study concepts, a theoretical framework and the literature review. This is followed by Section 3, research methodology. Section 4 presents the results and finally, Section 5 is the discussion and conclusions chapter.

Literature review and hypothesis development

The adoption of management controls

In this study, the adoption of management controls is centred on explaining how those systems, rules, practices, values, and other activities management put in place, in order to direct employee behaviour, can be identified, acquired and implemented, so as to enable firms improve their profitability and long-term survival [14] [15]. As such, management controls include all the devices and systems managers use to ensure that the behaviours and decisions of their employees are consistent with the organisation's objectives and strategies. Given that the array of mechanisms that form part of management control efforts is extensive, the control categories used in this study are as follows: planning, measurement, compensation, structure, policies and procedures, and socio-ideological [11].

Self-organisation and adoption of management controls

Self-organisation essentially refers to a spontaneous, dynamically produced (re-) organisation [12]. Natural self-organising systems function without central control and operate based on contextual local interactions. The particularity of self-organised systems is their capacity to spontaneously (without external control) produce a new organisation, in case of environmental changes [13].

Social behaviour of humans is also self-organised and gives rise to emergent complex global behaviours. The emergence is the fact that a structure, not explicitly represented at a lower level, appears at a higher level. With no central control, a complex collective behaviour then raises

from simple local individual interactions [13]. These behaviours, such as an organization culture, performance measurement systems, and strategic planning, are then referred to as management controls.

By employing mechanisms based on reinforcement, coupled with local interactions and local computations done by agents, management can engineer self-organisation, in order to provide a final coherent global state [13] such as management controls. In this approach, self-organisation is based on the capabilities of the agents to dynamically modify their behaviour, according to some reinforcement. It consists in the following basic principles: rewards increase agent behaviour and punishments decrease agent behaviour. The consequence is that an individual agent can adapt its capabilities and we can observe specialisation of roles, for example [12].

The task of those responsible for the strategic direction of an organization is not to foresee the future or to implement enterprise-wide adaptation programs, because nonlinear systems react to direction in ways that are difficult to predict or control. Rather, such managers establish and modify the direction and the boundaries within which effective, improvised, self-organized solutions can evolve. They set constraints upon local actions, observe outcomes, and tune the system by altering the constraints, all the while raising or lowering the amount of energy injected into the dissipative structure they are managing. Changes that produce positive cascades of change are retained, while those that do not are altered [10]. Indeed, it is well established that many

innovations can arise from the bottom up, via self-organised groups that take it upon themselves, with little direction to solve a problem. The total quality management literature, particularly that emphasizing quality circles and teams, explicates this process thoroughly [14].

Academic observers identify innovativeness [15], networks of interaction [6] and emergence [16] as key dimensions of self-organisation.

Innovativeness and adoption of management controls

Innovativeness relates to the firm's capacity to engage in innovation; that is, the introduction of new processes, products, and ideas in the organization [17], which result in significant improvement in outcomes [18]. Innovativeness reflects a basic willingness to diverge from the status quo and embrace new ideas [19]. Organisations that thrive, via innovative activities (the outcomes of innovativeness), do so because they have developed an architecture that helps them to innovate and adapt to situations no leader can fully foresee or understand [20] which is consistent with the self-organizing paradigm.

Innovativeness is a multi-dimensional organizational trait, including creativity, risk-taking, and openness to change [21]. Individual and team creativity form the starting point for innovation [18]. Thus, for instance, there is a widespread belief that decentralized and informal organizational structures facilitate innovativeness. Delegating authority to other firm members also encourages creativity, and poises the firm to capitalize on diverse solutions. These

features may contribute to the innovativeness of these firms [22]. Thus, it is expected that management of companies striving for innovations, will tend to apply more instruments in order to foster cultural control [23].

Openness includes whether the members of an organization are willing to consider the adoption of an innovation or whether they are resistant to it [17]. The flexibility and openness of these types of organizations, is believed to enhance innovativeness by encouraging new ideas [24]. Innovativeness in such organisations is demonstrated by an inclination to challenge the status quo and support new ideas in technology, new product development, and internal processes (Baker and Sinkula 2009).

Since innovation and adoption involve risks, risk-aversion and conservativeness reduce innovativeness [22]. Research suggests that innovation is more likely to occur in contexts (firms) in which innovative attempts are rewarded rather than punished [25]. This creative and risk-taking behaviour is only possible if it is facilitated by managers who are tolerant of mistakes and failure [26]. The stronger the top managers' support, the better chance that the innovation will be adopted [32] [26]. Hence, innovative behaviour requires some degree of risk tolerance and uncertainty [27].

Applied to management accounting settings, innovations include not just management accounting techniques, but also changes to work practices. This places innovation as a key overarching contextual variable to be considered in MCS design [18]. Several studies on MCS's have

acknowledged the role that the specific characteristics of innovative enterprises play regarding the implementation and design of MCS's [23]. [34] found a positive relationship between innovativeness and the level of supervisory support and reward systems. [35] also indicate that adoption is associated with an organic innovative culture and, marginally, with formal controls such as capital budgeting, financial decision tools, standard costs, and systematic evaluation of personnel. More recently, [36] found that innovativeness and control mechanisms in Tourism and Hospitality Family Firms are positively correlated. This leads us to posit that:

H₁. There is a positive relationship between innovativeness and adoption of management controls.

Networks of interactions and adoption of management controls

Scholars suggest that the conditions required for effective adoption of management controls reside less in hierarchical management strategies and more in the 'freedom of interaction among agents with diverse views' [28]. In social systems, the main driver of the self-organisation process is the interaction among members [29], and not any tendency of individual agents to prefer or seek order [30]. When the interactions of large numbers of components involve positive feedback loops, some behaviours self-amplify, quickly crowding out others, with mutual feedback leading to self-organised change and, thereby, the emergence of new organisations and systems [28]. Networks of interactions then enable ideas to disseminate and

spread [6]. For example, people or departments refine existing ideas and knowledge and recombine them; they then transfer them into new practices [31]. In other words, these ideas must then flow into the formal organizational systems and structures to create this change [32].

In a study of self-organisation in three Adelaide-based small or medium-sized enterprises, [38] find that one of the important indicators of a self-organising system is open, honest communication using multiple channels. [42] found that the social interaction of varying stakeholders resulted in a breaking down of barriers to integration through mutual adjustment. Therefore, we derive the following hypothesis:

H₂. There is a positive relationship between networks of interaction and adoption of management controls.

Emergence and the adoption of management controls

The construct of emergence suggests an alternative way that organizational structures, strategies, and practices can arise without being due to an imposition from command/control hierarchies. Appealing to emergence, accordingly, explains varied aspects of organizational dynamics through emphasizing spontaneous innovations which emerge out of interactions within social networks of persons and between persons and technologies. Typically, these innovations in organizational functioning are understood as the emergence of collectivities at the macro-level out of connectivities at the micro-level. Moreover, because these innovations are not the result of

imposition, it is believed they are more likely to exhibit creative solutions, are more likely to evoke employee commitment, and consequently are more likely to empower rather than disempower employee contributions [33].

Emergence happens after the system's parameters change and triggers behavioural changes in the organization, whereby its components take on new behaviours that none of them had before [34]. The emergent properties (management controls) are independently observable and empirically verifiable [45] [7]. Self-organization succeeds when the system supports the independent activity of its members by giving them, quite literally, a strong frame of reference [35]. The shared frame of reference is created by the shared values of the individuals in a social system [29]. Strong shared values then lead to the emergence of similar behaviours of individuals at various levels of an organization [36]. These shared values hold the behaviour of the organisation within boundaries, pulling the system into a visible shape [35]. Shared values then create norms of behaviour [29]. These norms and values form the organisations' identity which is critical to self-organization as it provides an internalized cognitive structure of what the organization stands for and where it intends to go - in short, a clear sense of the organization's identity [37]. A sense of identity then serves as a rudder for navigating difficult waters [38].

Results from an empirical study in three Australian SMEs indicate that the value system in an enterprise is needed for self-organization to occur [39]. [51] confirm the emergence of MCS, such as

financial planning, and financial evaluation, in young growing firms. And, in an effort to conceptualize the role and practice of accounting in dynamic and complex business networks, [52] illustrated how change is not a random process but the emergent, self-organised outcome of interactions, leading us to the hypothesis that: H₃. There is a positive relationship between networks of interaction and adoption of management controls.

Methodology

Research design, population, sample size

A cross sectional survey was conducted in order to examine the relationship between self-organisation and adoption of management controls. This method was selected because it enables collection of data from a large sample at a relatively low cost and is commonly employed for theory testing in management accounting research [40].

The study focused on large firms as they are more likely to have more comprehensive MCs than smaller firms, which often use mainly informal MCs or simpler management systems [41]. A single industry focus has the advantage of implicitly controlling for confounding factors as well as improving internal validity [42]. Since the target was large manufacturing companies, the study population included companies with an annual turnover of more than \$100,000 and employing at least 50 persons [43]. Consequently, 770 met the criteria for inclusion in the sampling frame.

Sample design and data collection procedure

Given that the increasing levels of non-response in management accounting studies [40], questionnaires were issued to all 770 firms. Managers were selected as key informants because it is believed that they can provide the most reliable information in regard to the controls used in their firms [44]. Ultimately, 202 usable questionnaires were retained, generating a final response rate of 28.6%.

Non-response bias

In order to examine for non-response bias, the responses from the first 20% of returns and those from the last 20% were compared, to test if responses differed between the two groups. The results of an independent samples t-test for each of the study variables show no differences between the groups, providing support for the absence of a non-response bias.

Measurement of constructs

The measurement of constructs drew on well-established survey instruments from previous research. The items were anchored on a six-point Likert type scale because, in avoiding to score the midpoint, respondents are required to deeply process each question and response option, thereby reducing response biases, and improving the validity and reliability of their responses [45]. All the measurement items were reflective, as the indicators are caused by the latent variable [46]. The items for adoption of management controls were drawn from the framework proposed by [15]. A sample question was “in our company, the

following are part of our day-to-day operations...budgets are prepared regularly, a staff canteen is available to all staff, staff are provided uniforms, we have job descriptions. As regards the source of the management controls, a sample question was “When your company was making the decision to take on the above management controls, the following sources of information were important... Fellow Managers, Internal reports, Other Staff in the company.” In measuring self-organization, a sample item for networks of interaction was...” I openly share information, with other managers”. For innovativeness, a sample item was “Innovation in our company is perceived as too risky and is resisted (R)”. For emergence, a sample item was “I have observed new management controls emerging in this company.”

Common method variance

To minimise the bias caused by responses systematically varying because of the use of a common scaling approach on measures derived from a single data source [47], considerable effort was made to ensure a well-conceived questionnaire design and data collection procedure, as elaborated by Van der Stede, et al., (2007). In addition, a test for CMV in PLS-SEM was employed [48]. The results presented in table three indicate that all the inner VIF values for the study variables are below 3.3, suggesting absence of CMV.

Controlling for endogeneity

The potential for endogeneity exists in virtually all accounting studies, especially when using survey data [49]. The study controlled for the following firm factors in the structural model, since they are shown to have a positive relationship with the adoption of management controls. Firm size measured as the number of employees working at the end of the year [50] and sales revenue (turnover) in the preceding year [51], Age is defined as the date on which the company was registered [50], ownership by indicating whether they were foreign or locally owned firms [52], Legal registration in terms of ownership differences among private and public firms [53], as well as manufacturing sub-sector.

Data analysis and results

The data analysis consisted of four stages; first, the data was cleaned following [67]’s procedures. Specifically, an examination was made to see if the data contained missing values, followed a normal distribution, existence of outliers, homogeneity of variance, as well as non-linearity. Second, descriptive statistics as well as correlations were obtained to get a feel for the data and assess whether it warranted SEM, using SmartPLS v3 software [54]. The third stage involved assessment of the measurement model, for validity and reliability of the measurement instrument, and finally evaluation of the structural model, to enable hypothesis testing.

Descriptive results

Since the unit of analysis for this study is a manufacturing firm, it is important to consider the characteristics of the participating firms. 63% of the firms has been in operation for above 16 years. 52% had above 100 employees, and a turnover above 100,000\$ in at least one of the previous three

years. Also, the majority of the firms are involved in agro-processing (34%), followed by machinery and equipment (12%), textile and wearing apparel (11. 67% were registered as private limited companies.

Firm Age	Count	%	Registration Status	Count	%
6 - 10 Yrs	45	22.3	Sole Proprietorship	21	10.4
11 - 15 Yrs	29	14.4	Partnership	35	17.3
16 - 20 Yrs	55	27.2	Private Limited Company	135	66.8
Over 20 Yrs	73	36.1	Public Limited Company	11	5.4
Total	202	100	Total	202	100
Sub-sectors	Count	%	Nationality	Count	%
Agro-processing	69	34	Ugandans	120	59.4
Furniture	13	6	Foreigners	51	25.2
Metal Products	17	8	Ugandan & Foreigners	31	15.3
Paper Products & Printing	21	10	Total	202	100
Machinery & Equipment	25	12			
Leather & Related Products	10	5			
Textile & Wearing Apparel	22	11			
Bricks, Cement & Concrete	25	12			
Total	202	100			

Table 1: Descriptive statistics for the study population

The characteristics of the managers indicate that 55.5% and 44.5% were male and female, respectively. 41% Generation Xers, and 59% Millennials. Over 60% had more than 5 years' job tenure. At least 70% had a university degree. The distribution based on department was 16% from Finance, 25% Production, 23% HR/ Admin, 25% Sales and Marketing, 10% Transport and Logistics.

Measurement model assessment

The reflective measurement models were assessed with regard to their reliability and validity [55], as summarized in Table 2. Indicators with loadings above 0.708 were retained, as they indicate that the construct explains more than 50 per cent of the indicator's variance, thus providing acceptable item reliability. For internal consistency reliability, the Cronbach's α and the composite reliability values for all the constructs lie

within the recommended range of 0.7 to 0.95, thus establishing sufficient content validity. The average variance extracted (AVE) values, for all the study constructs, are above 0.5, demonstrating adequate convergent validity. The heterotrait-monotrait (HTMT) ratio of the correlations [56] for all the study constructs are all below 0.85, demonstrating sufficient discriminant validity.

Variables	Values			
	α	CR	AVE	VIF
Self-Organisation				
Innovativeness	.72	.84	.640	1.428
Networks	.84	.90	.765	2.209
Emergence	.89	.91	.654	2.347
Adoption of Management Controls				
Initiation	.91	.94	.797	2.455
Decision	.95	.95	.697	2.861
Implementation	.93	.94	.657	3.202

Table 2: Construct Reliability, Validity and VIF Values

Structural model assessment

Following [69] the results, in table 2 indicate that collinearity was not an issue, as the VIF values for all the study constructs are below the threshold of 3. The next step involved assessing the model's explanatory power, by examining the R^2 value of the endogenous construct. As a guideline, R^2 values of 0.67, 0.33, or 0.19, are described as substantial, moderate, or weak. The results, presented in table 3 indicate that the R^2 for adoption of management controls is moderate (0.41) providing support for the model's in-sample model fit.

An assessment of the f^2 effect size was also carried out in order to evaluate how the removal of a certain predictor construct affects an endogenous construct's R^2 value. Values of 0.02, 0.15, and 0.35 can be viewed as a gauge for whether a predictor latent variable has a weak, medium, or large effect at the structural level. The results indicate that emergence (0.037) and innovativeness (0.037) have

the highest effect on the adoption of management controls.

Stone-Geisser's Q^2 , using the blindfolding procedure, assessed the model's predictive ability. Q^2 values above zero offer evidence that the observed values are well reconstructed and that the model has predictive relevance. From the study results, all the values for the predictor variables, are above 0, innovativeness (0.469), networks of interaction (0.469) and emergence (0.275), further supporting the model's predictive accuracy.

Having substantiated the structural model's explanatory and predictive power, the final step was to assess the path coefficients in the structural model, in terms of sign, magnitude, and significance. This was achieved by running the nonparametric bootstrap procedure. The results indicate that the direct relationships between innovativeness (95% CI [0.045, 0.343]) and emergence (95% CI [0.050, 0.302]), and the

adoption of management controls are all positive and significant, since the confidence intervals do not contain zero. Thus, H₁ and H₂ were both supported. The relationship between networks of interaction and adoption of management controls

is insignificant, since the bias corrected confidence interval contains a zero (95% CI [-0.028,0.292]). Therefore, hypothesis H₃ was not supported.

Paths	β	t-value	p-value	95% CI	Decision
Emergence -> AMC	0.170	2.636	0.008	0.050,0.302	Supported
Innovativeness -> AMC	0.195	2.562	0.010	0.045,0.343	Supported
Networks of Interaction -> AMC	0.126	1.553	0.120	-0.028,0.292	Rejected
Firm Age -> AMC	0.009	0.132	0.895	-0.129,0.150	
Legal Reg. -> AMC	-0.199	2.979	0.003	-0.328, -0.065	
No. Employees -> AMC	-0.217	2.282	0.022	-0.406, -0.038	
Ownership -> AMC	0.110	1.818	0.069	-0.012,0.227	
Sub-Sector -> AMC	-0.085	1.538	0.124	-0.188,0.029	
Turnover -> AMC	0.448	6.100	0.000	0.299,0.588	

Table 3. Bootstrapping results. Note: AMC= Adoption of Management Controls

R²= 0.406, Adjusted R²= 0.378

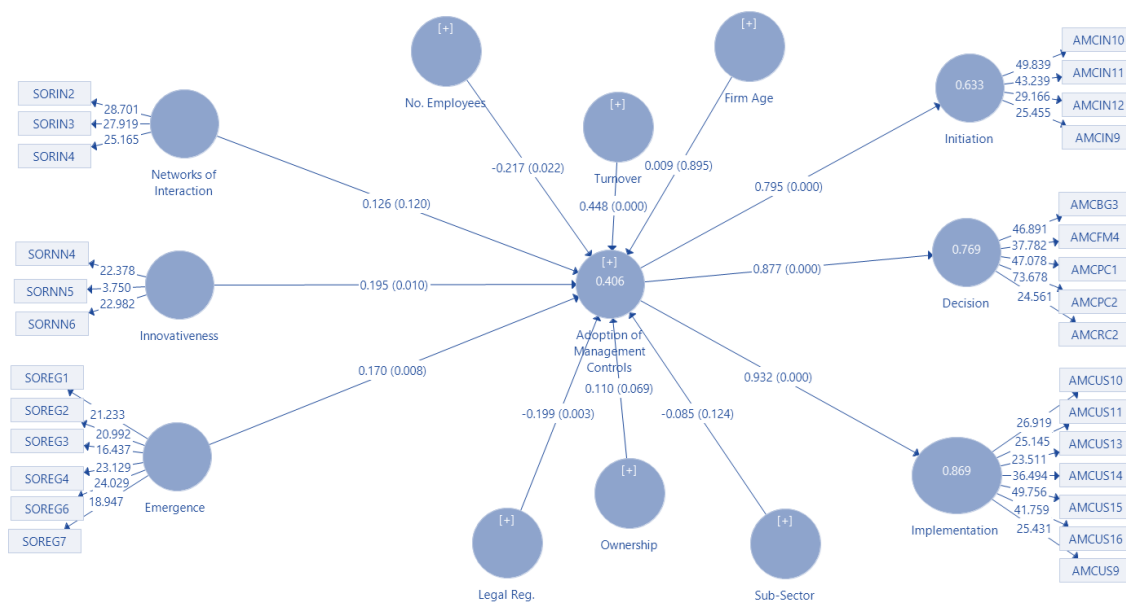


Figure 1: Structural Model for Self-Organisation and Adoption of Management Controls

Control variables

The results indicate that, overall, the only positive and significant contingent factor associated with the adoption of management controls is firm size, as measured by turnover. This suggests that management controls are adopted as the firm increases revenue and can therefore experiment with administrative innovations [57]. Due to the inclusion of these control variables, the relationships of the main model are no longer influenced by the included control variables.

Discussion

From the results, a positive relationship between innovativeness and adoption of management controls was also established. This means that the higher the innovativeness among manufacturing firms, the higher the degree of adoption of management controls by that manufacturing firm. Thus managers, in manufacturing firms, should encourage staff to take risks, search for ideas on new products and technologies, while being supportive and tolerant of mistakes. The managers can exercise their innovativeness through socialisation mechanisms, commonly referred to as cultural controls [58], such as education and training, providing staff uniforms, and rituals such as the annual Christmas party. This will provide a conducive environment for staff to engage in deliberation on ideas and work together, and with management. This will be evidenced by such firms being the first to market consistently with new products, as well as increase their introduction of new products. These findings are consistent with

[73] who find that recognising innovation, and maintaining interpersonal relationships, had the most positive effects on a firm's innovativeness.

From a practical point of view, while innovativeness may encourage generating ideas, management controls such as product life cycle analysis, discounted cash flow, and forecasting, can help in identifying potential areas for improvement, test the efficacy of ideas, focus staff on organizational goals, as well as provide motivation, when linked with reward systems like sales commissions, and performance bonuses, thereby promoting the manufacturing firm's performance. It is this potential for management controls to provide discipline during resource planning and implementation, that assists in the translation of ideas into effective performance. These findings are in agreement with [74] who find that management control systems are of great value to innovation companies. Similarly, [75] find that organisational innovativeness will help decrease system-wide costs and enhance service levels since organisations, are looking for ways to cut costs, enhance service levels, improve performance and make their activities sustainable.

Emergence is also positively correlated with adoption of management controls. Thus, the level of adoption of management controls by a manufacturing firm will increase with emergent behaviour, within the firm. This implies that the emergence of management controls is only complete if staff identify with the adopted management controls. The staff's identification with these management controls is occasioned by

their involvement in the development of the management controls, and will be demonstrated by their effort in using these controls to, among others, plan how operations are to be conducted, identify significant exceptions from expectations, communicate the company's core values to the staff, track progress towards goals and monitor results. These findings are in tandem with [76] who find that identity may provide guidelines for organizational action, that is, potentially operate as a device for the exercise of managerial control. Practically, these management controls will readily be observable by the staff because, a manager who identifies with the management control will likely ensure that other staff become aware of such controls by, for example, incorporating them in the company's code of business conduct. Thus, employees will better understand the meaning, and the value of the management control and, as a result, will engage more actively in its adoption. This finding is consistent with a study by [77] who find that interactions between team members generated new behaviour such as new communication strategies and complex procedures which none of them have ever done before.

The relationship between networks of interaction and adoption of management controls is insignificant. The manufacturing firms lacked mechanisms that positively influence interactions, via open and timely information sharing, amongst the staff. This finding is surprising given that there is a high level of innovativeness within the manufacturing firms, albeit focused mainly on manufacturing

innovation. This finding also contradicts earlier studies. For example, Omeke et al., (2019) find that managers in SACCO's interact, exchange, and share information, in order to become aware of problems and opportunities within their business environments. This contradiction could have several explanations. [78] findings suggest that mutual interactions, which seem to enhance the ability to share generated ideas or mind-sets in addressing prevailing challenges, correspond to or promote employee's innovativeness only through the degree of freedom provided to achieve desired goals. This is possible only if measures are in place to permit and quickly set up improved means in work methods developed by junior employees. This may be challenging for two reasons. First, managers in African, generally, and Ugandan contexts specifically, are used to a top-down command and control leadership style, which may not be suitable for a bottom-up emergent management controls style. A study by [79] using CAS, in Kenyan hospitals, lends some support to this. They find that while 'hard' leadership and management skills (e.g., budgeting and planning) were weak in both hospitals, the differences in the case study hospitals lay in the so-called 'soft' relational skills. For example, the PSRA process in Hospital B was more inclusive and deliberative, and perceived by hospital actors to be fair because the medical superintendent in this hospital reached out to different actors and "negotiated" with them to participate in the processes. This is in contrast to Hospital A, where the PSRA process was perceived by actors to be unfair and non-inclusive. The medical superintendent in this hospital made

no effort to actively involve or empower the different actors in the hospital and hence the PSRA. Secondly, the bottom-up approach to management control, which encourages employees to express their opinions, suggestions, and concerns about work-related issues and offer feedback on their input, has been implemented in 'western' or 'developed countries' manufacturing firms, e.g., total quality management. However, this study's findings do not indicate such techniques being present in Ugandan manufacturing firms. It could be that the data for this study came from manufacturing firms that need to emphasize discipline and coordination to function smoothly. According to [80] manufacturing firms have very specific goals and need coordinated activities across departments. The decisions that are made must be implemented

Conclusions

The aim of this study was to establish whether self-organisation leads to the adoption of management controls. The results of this study provide empirical evidence on how self-organisation enables the adoption of management controls. Overall, this study contributes to the literature by adapting complexity theory to develop a generalizable model that explains the adoption of management controls in manufacturing firms.

Theoretical and managerial implications

The results in this paper have important implications for both theory and practice. On the theoretical standpoint, the results suggest that a combination of innovativeness, and emergence,

drawn from complexity theory, can explain the adoption of management controls in manufacturing firms. On the practical side, managers in manufacturing firms need to encourage risk taking behaviour by their staff if they are to innovate and respond to the dynamism in the environment. Additionally, these firms should create a climate where information is exchanged easily in order to make proper decisions. Second, for bottom-up initiatives instigated by an individual team member or small group of team members within a department, managers should not only encourage such innovation, but provide some boundaries around how the innovation is prioritized, the time span for innovation, how the resultant changes are implemented, and how to best share the findings with other relevant departments. Based on the study findings, this will give the staff members the additional support needed to navigate complexity while still executing on the innovation idea.

Limitations and directions for future research

The results of this study should be considered in light of several constraints. First, quantitative methods are limited in exploring social systems in situ. A future study employing a case study methodology can help derive richer, more contextualized, and more authentic interpretation of the social processes that lead to the adoption of management controls [59]. Second, as the sample selected was not random, the findings of this study should be interpreted as relating to the largest manufacturing companies, not to the general population of manufacturing companies, in

Uganda. Thirdly, our conceptualisation of self-organisation was quite narrow. However, complex adaptive systems are quite expansive, with several dimensions, which may also influence the adoption process. Future studies could explore these relationships further.

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