Management Control Systems in Organizations in Prigogine’s “Far From Equilibrium Conditions”

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Abstract

Extending previous management studies which have used Prigogine’s concept of dissipative structures, we explore the roles of management control systems at one end of the change continuum - extreme external and internal instability or “far from equilibrium” conditions. We use two longitudinal case studies of organizations in such conditions using data sources including interviews, observation and document analysis. At a point of instability called the bifurcation point, a system can collapse into chaos and we trace the electricity generator and retailer ETSA in the 1990s, which despite considerable investment in management control systems split apart. The second case, a European financial institution (EuroFinance) in the 2000s, shows an organization which survived both internal and external crisis by modifying its management control systems to reframe and transform and therefore move to a higher order of organization – a dissipative structure.

Keywords: dissipative structures, management control systems, bifurcation point, chaos, levers of control
1. **Introduction**

Much thinking about the role of management control systems in organizational change is largely posited in a view which Hines (1992, p.324) suggests is “mechanistic, non-interactive and linear”. While this assumption may appear to hold in an organization for long periods of time where rule based approaches may succeed (Maguire and McKelvey, 1999), there come points where there is radical change and assumptions of linearity become untenable. Within the field of complexity theory (e.g. Simon, 1962; Maguire and McKelvey, 1995; Thietart and Forgues, 1995; Meyer, Gaba, and Colwell, 2005; Moldoveanu, 2005; Campbell-Hunt, 2007) we use Prigogine’s theory of dissipative structures (Burgelman, 2009) to explore organizations seemingly out of control, in far from equilibrium conditions. At a critical point, the bifurcation point, there can emerge a dissipative structure with higher levels of order or there can be a complete collapse of the system. The purpose in this paper is to use two different organizations at the bifurcation point to investigate an unexplored area of the role of management control systems in these far-from-equilibrium conditions. Management control systems is understood broadly in this paper following Simons (1987, p.358), as “formalized procedures and systems that use information to maintain or alter patterns in organizational activity”. Immediately there appears a potential clash between complexity theory with concepts such as self-emergence, non-linear dynamics and attractors and the concepts of management control systems with a goal of management altering patterns of organizational activity.

Models of organizational change in accounting research seem to focus on relatively incremental change whereas the management discipline has been less timid about exploring organizations on the edge of chaos (e.g. Brown and Eisenhardt, 1997; Maguire
and McKelvey, 1999; Mathews, White and Long, 1999; Davis, Eisenhardt and Bingham, 2009). Even models of second order change with major environmental disturbances such as “colonization” (Laughlin, 1991) are still not as dramatic as the change at bifurcation point. At this point there are multiple trajectories possible - destruction, division into several smaller organizations and amalgamation. The sub-systems and archetypes (Laughlin, 1991) can be extinguished or altered to the point of unrecognizability. This paper adds to the previous literature by adding a fifth “track” as a response to disturbance – destruction or rapid development.

Accounting research has used concepts such as environmental uncertainty (Chapman, 1997; Hartmann, 2000), environmental difficulty/hostility (e.g.Khandawalla, 1972; Otley, 1978) and drawn from complexity theory (e.g. Hines, 1992; Jermias and Gani, 2004). Dynamic environments have become more central to our understanding of changing management control systems (Bjornenak and Kaarboe, 2012), Chenhall (2003) raises the question of how organizations face conditions of uncertainty, turbulence and hostility; a question which is difficult to answer while the underlying assumption of much of our research is a world closer to Newtonian mechanics than the dramatic change on the edge of chaos as envisaged by Prigogine.

Even within complexity theory, there are conceptions of emergence and self-organization which embody ideas of change which typically are incremental and relatively slow. Indeed, drawing from evolutionary economics has led to research which demonstrates the survival value of inertia (Hannan, Polos, and Carroll, 2004). While the concept of whole systems change is recognized in the management literature (Argyris and Schon, 1978) it is often obscured by approaches which assume stability and
equilibrium seeking. Drawing from Prigogine has moved management researchers (e.g. Burgelman, 2007, 2009) to look at change more radically; “Change must not be thought of as an emergent property of organization. Rather, organization must be understood as an emergent property of change” (Tsoukas and Chia, 2002, p.570).

This paper shifts the focus to situations of dramatic change and how management control systems are involved at these points of significant transformation with implications for management control systems in situations of greater stability. This paper outlines the ideas of Prigogine and then introduces a case study of two organizations to illustrate how the theory can be useful to explore the role of management control systems in organizational change. In particular, we focus on how management control systems can be entirely powerless or alternatively be part of the self-organizing to survive and redevelop.

2. Exploring Prigogine

The Concepts of Dissipative Structures

In a closed system, systems lose energy and order according to the second law of thermodynamics. In open systems, order may be maintained and even increased by drawing information and energy from the external environment. Entropy, to Prigogine, is not about running down systems but enabling them to move to even higher complexity.

A dissipative structure draws energy from the environment which in turn may cause it to disintegrate but may cause it to move to a higher order of organization. The insights of Prigogine (Prigogine and Stengers, 1985; Prigogine and Nicolis, 1989) have been
illustrated, amongst other ways, by Bénards experiments (Burgelman, 2009). A Bénards cell has two plates with fluid between; fluid which is heated between the plates creating molecular motion at increasing velocity. Below the first critical number (the Rayleigh number) the molecules stay in place but collide with each other in transmitting energy; a system with energy but still stable. Above this first point there is a qualitative change; the molecules start to shift around in bulk movements. When the second critical point is reached the behaviour of the molecules becomes chaotic and the system can move to new unpredictable forms. Bringing in an external disturbance in a simple physical system creates a shift further and further from equilibrium; small fluctuations are amplified. At a certain point complex self-organizing behaviour will emerge and then another point will be reached “far-from-equilibrium” where turbulence is experienced. This is the bifurcation point where the system can emerge into different states, not with any blueprint but through spontaneous self-organization. There is unpredictability, not a managed change process, for “Nothing in the description of the experimental setup permits the observer to assign beforehand the state that will be chosen; only chance will decide, through the dynamics of fluctuations.” (Nicolis and Prigogine, 1989, p.72). However, it must be noted that even in science the idea of chaos: “is not utter confusion. It is constrained, rather than explosive, instability. It is a combination of order and disorder in which patterns of behaviour continually unfold in irregular but similar forms.” (Stacey, 1995, p.62).

Prigogine’s theory suggests that equilibrium could be maintained for long periods of time; stable systems can absorb even small external energy inputs and disturbances for some time. Dissipative structures are not fixed structures but as the original structure loses symmetry and pattern by drawing in energy it may move to higher levels of
organization. To maintain this new order in far from equilibrium conditions the structure needs to draw in energy and information. As Stacey (2007, p.193) puts it: “An equilibrium structure requires little effort to retain its structure and great effort to change it, while a dissipative structure requires requires great effort to retain its structure and relatively little to change it.”

Dissipative structures and management

This concept of dissipative structures has been drawn into human behaviour first by Prigogine himself writing with Stengers (Prigogine and Stengers, 1985) and in Toffler’s long introduction to the book. Prigogine and Stengers (1985, p.71) are very clear about the leap from scientific observations to human experience: “We see that human creativity and innovation can be understood as the amplification of laws of nature already present in physics or chemistry”.

The connection with management goes back nearly 30 years with papers in Human Relations by Gemmill and Smith (1985) and Leifer (1989). The ideas have been picked up by management scholars like Robert Burgelman (Burgelman, 1983; Burgelman and Grove, 2007, Burgelman, 2009), a renowned strategy processual theorist, who has used it to explore far from equilibrium situations at Intel. Dissipative structures continues to be drawn from by avowed complexity theorists as well as management scholars seeking to explore far from equilibrium conditions (Anderson, 1999; Tsoukas and Chia, 2002; McKelvey, 2004; Meyer, Gaba, and Colwell, 2005) and has now entered management textbooks (Stacey, 2007). There has been considerable refinement of the models drawing Prigogine into management. Recently De Toni and Comello (2010) depicted the application to management as per Figure 1.
Usually theorists equate an organization as a system; admittedly a potentially problematic idea. Moving across the values of $\lambda$, at low levels of $\lambda$ up to $\lambda_c$ an organization may be very stable, damping out fluctuations with change that does not create chaos. As disturbance increases the members of the organization may still be behaving as if their world is in equilibrium and ordered. They can still behave as if their world is deterministic where standard management routines of cybernetic control systems like strategy formulation and implementation, budgetary control systems and marketing management can behave in some ordered way. The system is linear and predictable. There comes a time when increasing change brings the organization to a point where change cannot be denied. This is the critical point, the bifurcation point. Now the system becomes completely unstable, a “point of discontinuity”. At this point the system is not just at non-equilibrium but can be what Prigogine described as “far from equilibrium”. Non-linearity is evident; incremental and minor changes create substantial disturbance which ripples through in the well-known butterfly effect.
Customers, employees, and shareholders do not appear to be behaving in a predictable manner. Disorder is the state of the organization.

At the bifurcation point, organizational actors and its stakeholders have many solutions but the movement in one direction may spin the organization to destruction. Others might spin the organization to more complex and sophisticated forms. Leifer (1989) constructs a circle, accounting for decreasing entropy production and increasing the gap between environmental demands and organizational adaptive mechanisms.

Figure 2 Leifer's circle

_Dissipative Structures and Management Control Systems_

A major deficiency of MCS, identified by Dermer and Lucas (1986, p.471), is the 'illusion of control'; the illusion “... that conventional controls ... accurately and validly measure, and thereby help determine, behaviour. ... management can intervene when necessary
and successfully effect change. ... To those managing with an illusion of control, negative consequences of managerial action often signify the necessity for more controls”.

Reflecting on MCS using the thinking of Prigogine would suggest that for organizations in a far-from-equilibrium position the reason is more connected with the impossibility of managing under assumptions of linearity and cause-effect. Even in more stable positions Prigogine and Stengers (1984, p.203) use an illustration to demonstrate that “we have very little understanding of how a complex system is likely to respond to a given change”.

The possibility of apparent randomness and chaos is underdeveloped in the MCS literature with much focus on optimization. Prigogine and Stengers (1985, 207) outline the problem of optimization which can lead us to “ignore the possibility of radical transformations ... that change the definition of a problem and thus the kind of solution sought – and the inertial constraints that may eventually force a system into a disastrous way of functioning”. In keeping a focus on optimization it is probable that the renewing forces of randomness and the potential beneficial but unknown consequences of such change are marginalized.

One could dig deeper and explore the problem of MCS as a relatively closed system with management able to stand outside of the organization and manipulate it. To conceptualize an organization as a system “reifies human action” (Stacey et al, 2000, p.58); it “locates human freedom and participation ...outside the ...system we are using to explain it” (op cit, p.58). Inevitably system theorists establish some agency located outside of the system to make choices and direct the system towards those choices.
Systems, including MCS, in organizations can only work if “the members of the organization weave their day-to-day interactions with each other through and around the rules of the systems they have designed” (op cit, p.59). Burke (2004) raises the concern that we have moved to “the cult of performance” built on the shaky foundation of unrestrained management agency and future certainty.

Moving to dissipative structures helps explain how MCS can appear to work at low levels of change, but then appear to be providing no “control” at high levels of destabilization or external disruption. At low levels of energy the MCS acts as one of the dampening mechanisms, keeping the organization stable and “manageable”. Yet as disturbance increases there is an increasing disjunction between the MCS and the environment. For example, Budgetary variances become so large that all are exceptions; management by exception becomes impossible. The performance measurement system is unable to keep up and the linkages in a system like the balanced scorecard start to break up. “Alignment” touted as a goal of such systems is increasingly difficult as the goals of the organization become less clear.

Actors in organizations willing to embark on reframing and visioning, find that MCS provide a vehicle for achieving such major changes as turbulence increases. An interactive control system may enable future sensing and enable the organization to explore a landscape of possibilities. Yet within Prigogine’s framework, MCS may cease to provide any meaningful input in far from equilibrium situations for “the decision-making processes that involved forecasting, envisioning future states, or even making assumptions about future states, would be problematic in terms of realising a chosen future” (Stacey, 2007, p.195).
This leads to the central research proposition: in far-from-equilibrium conditions MCS may have no impact as the organization spirals to destruction or they may be part of the new energy which moves the organization to dissipative structures. In addition, we indirectly address the issue raised by Chenhall (2003, p.138) as to forms of control in situations of high uncertainty as to whether there can be a "blend of tight controls with the opportunity to source more open, informal and subjective information”.

**Levers of Control**

As a useful device in exploring the different approaches to management controls over time, we use Simons's (1995) Levers of Control framework. Simons developed this over ten years of research, based on case studies and ‘action-oriented theory of control’ of more than a hundred US companies. His four levers are belief systems (i.e. core values), boundary systems (i.e. behavioural constraints), diagnostic control systems (i.e. monitoring), internal control systems (i.e., forward-looking top-management involvement).

**3. Research Methods**

The theory of dissipative structures is explored with a selection of two illustrative cases, ETSA, the Electricity Trust of South Australia, and part of a financial institution which goes by the pseudonym of EuroFinance. There is an assumption that organizations can be equated to open systems; an assumption without its critics. These cases are selected because in the EuroFinance case they moved from the bifurcation point to a dissipative structure whereas ETSA moved to destruction as an entity. At ETSA, data collection commenced in a single Department within ETSA in late 1993 and lasted into 1998.
Sources of information included internal records and memos, observation of meetings, telephone contact, conversations, the official history by Linn (1996) and previous academic research by Patrickson (1995) and Birkett (1992). Eighteen staff were interviewed in 1994 in a range of positions from the manager of the Department to “shop floor” employees; the same staff were interviewed again in 1997. Data collection at EuroFinance was through 34 interviews from the CEO down through the Asian branches, memos and records and significant observation of meetings. Some observations and analysis of Head Office changes was undertaken but there is an inherent limitation of focusing on one region – Asia. The study covers the nine year period from 2002 to 2011 although most of the focus in this paper is in the period from 2007 to 2011. In both cases NVivo was used as a tool enable the identification of key themes.

4. The Lack of Utility of MCS at the Bifurcation Point – the ETSA case

ETSA went through dramatic change in the 1940s when it was privatized and became the government owned power utility. A rapid period of growth followed as it built an entire new network across the state of South Australia and matched the rapid industrial development after World War II and a rise in population requiring the continual development of residential power infrastructure. In the late 1980s the population growth slowed and ETSA found itself geared up to a much higher level of capital development.

While there had been some project accounting, most of the systems were fairly loose. The belief system was built around unlimited resources - the “bottomless bucket of
money”, when there were not serious controls on spending and management control systems were relatively informal. As one interviewee expressed it:

“Well the mentality of ETSA has been no different to the rest of the public sector what you do is you put up a budget and you get your budget approved and then you set about trying to spend your budget; so the culture is always a spending culture”.

Another aspect of the belief systems was people. Human resource management was based on jobs for life with apprenticeship training programmes developing skilled young people (almost always men) who then progressed through the organization as a lifetime career or quickly moved out into successful careers in the private sector. Comfortable working relationships between management and unions meant that efforts were made to track and progress individual careers. Vital informal networks were built on job rotation where supervisors and middle level managers not only knew the functions and problems of other areas but knew the other managers so that problems could be quickly fixed across the formal electricity network.

It was not surprising that such an organization was fairly resilient to injections of energy. The first point was crossed in 1988 with the appointment of an outside CEO, not a public service manager but experienced in an international oil business. He had little regard for unions, for the public sector structures and the previous belief systems. This was followed by the formation of a “national” electricity grid in Australia which brought strong winds of competition – electricity could be purchased from any power station in south or eastern Australian. This potentially was a huge disruption to the system, analogous to bringing in heat to the Bernard’s cell. Initially the status quo was relatively preserved. The organization did go through a process of significant downsizing but with the basic structures still intact. The management control systems did also change. The
CEO appointed in 1988 created a system of semi-autonomous units with internal customers and a cross-charging system where each section needed to be viable in its own right. Diagnostic control systems drilled down to each section of each department. The cross charges were not based on cost but a rate which would be market contestable encouraging managers to look outside and focus on developing interactive control systems to be future seeking.

At this time there was considerable investment in a strategic cost management system built around activity based costing. This system was designed to assist orderly change by identifying activities and processes which could be eliminated or improved. The horror stories emerged of past practices of rebuilding components in the workshop for many multiples of the cost of the new part. With resources such as spare parts and floor space being charged to managers there were rapid reductions in the use of some resources. Staff redistributed or lost through attrition were not replaced. This use of a diagnostic control system to absorb change and modify behaviour in an orderly way did not last.

This period of change was terminated by the hiring as CEO a manager that came from a local monopoly listed gas distributor and brought with him a subordinate to a key management role. With them they brought very conservative centralized approaches to management and another change in belief systems. Devolution of control was removed and the MCS that supported devolution was scrapped, ostensibly because it was too cumbersome and expensive to maintain. What emerged was a belief system which re-introduced command and control, top-down and that cost control, not profit, was the goal of the organization.
The point of strategic dissonance was around 2004 with such substantial changes to the organizational fabric that there was no opportunity for return. On the last day of the financial year, 30th June 1994, large numbers of staff exited the organization utilizing generous voluntary redundancies. The organization had now passed the bifurcation point where the organization was going through massive change, not able to continue to stabilize. Rather than going through the Leifer circle through experimentation and resynthesis, the organization disintegrated at the bifurcation point and followed the trajectory to the right. However Leifer’s model suggests that denial is the cause of the disintegration, an issue which is explored later.

The political heat coming on the organization intensified under the mantle of the state-based Liberal government. This same party that had nationalized electricity generation and distribution was now privatizing those assets and the assets that had been built over the succeeding decades. Central to this change was the $3 billion debt created by the government-backed State Bank of SA. Also bringing energy into the situation was the national Productivity Commission supported by the national Labor government which argued that competition would only come from breaking up the complete supply chain of ETSA and creating competition at every level – generation, wholesale distribution, local distribution and retailing. ETSA as it then was ceased to exist.

The result of the bifurcation point was the split up of the organization into three parts. The most prominent was the electricity distribution business which retained the name of the original organization in type ETSA Utilities. The public distribution assets, theoretically retained in government ownership, were leased to an organization owned
by Hong Kong magnate Li Ka Shing for 99 years. This remains the most conspicuous part of the network, for it is this part which is in the media spotlight for power outages and distribution problems. It has now taken on the systems of the wider network of Hong Kong based companies with its strategic direction and systems as much in the hands of the Ka Shing group as in service needs in the local environment. With the ability for cost recovery and profit under service agreements it has even grown its labour force.

The larger section of the distribution network was sold off to a separate company, Electranet. This section reabsorbed some of the old ways of doing things from ETSA with profit seeking goals interposed upon it. The investment in management control systems brought about significant change.

The retailing of electricity is now under diverse national private sector organizations offering contracts for electricity. They are conspicuous through telemarketers and contract door to door sales staff; a far cry from the government utility sending out electricity invoices. Yet in many ways there is a certain sameness; the very similarity of the retailers has left most households continuing to use the retailer who initially took over the ETSA customers and real electricity prices rising quickly.

The South Australian government sold its generators of electricity including the coal fired power stations at Port Augusta. This part of ETSA lost all connection with the other parts – it had been spun off completely. These assets are under further threat from the impact of carbon pricing. Divesting of this asset may have been in the interests of the government but another branch of government is encouraging closure.
Genuine difference in the market has been created by state level governments promoting and financially supporting wind farms and solar panels for households and public buildings. The development and growth to higher order has come from energy and information supplied in a different way outside of the electricity generation and reticulation business that existed before.

5. MCS and dissipative structures - EuroFinance

The Global Financial Crisis and the collapse of Lehman brothers in quarter 3 of 2007 plunged most financial institutions into serious economic turbulence. It is difficult to judge how far from equilibrium this brought EuroFinance, although the losses were compounded by the immediate impact of a significant internal crisis in early 2008 with large losses and damage to the firm’s credit rating and reputation. The enormous disturbances that EuroFinance had faced earlier in the 2000s meant that it had already been through the Leifer circle in the 2000s. We trace the response post GFC within the organization to draw in more resources and move to higher level of activity as expected in a dissipative structure.

The 2008 crisis brought about drawing in of energy by immediate changes to the EuroFinance top management team. A board appointed Special Committee, comprised exclusively of independent directors, worked on a project to enhance operational control, reinforce operational risk management, and promote a culture of accountability, discipline and mutual respect. The EuroFinance CEO was replaced in late 2008 with the Chief Operating Officer (COO) being replaced later in 2009. Following the appointment of new CEO, Head Office announced a project to optimize the
business model by re-organizing the business lines world-wide. A year later, the new Chief Operating Officer launched a project to re-organize the resource functions to enhance the operating model by focusing on talent development, controlling operational risks, improving efficiency and developing business. EuroFinance was drawing on external energy to move the organization to a higher level.

*Changes in strategic presence and organization structure*

In late 2008, the head office re-aligned their worldwide strategic presence to better manage capital and resources, closing four foreign business units in Asia and centralizing some operations to regional offices. They created a new division in 2008 to reduce risks including a team responsible for operational security ensuring the efficiency of operational risk management and monitoring, enhancing fraud prevention and detection, and challenging the design and effectiveness of control systems. To strengthen the organizational structure and operational risk prevention systems, EuroFinance reorganized its support functions. All Foreign Business Units were required to align with the global framework.

To force the group to unlearn old behaviour, EuroFinance undertook a six week study in early 2009 which resulted in the integration of two business lines, and all Foreign Business Units were required to align with the global framework. Changes were made to the designations and reporting lines of a number of business lines.

In addition, the CEO reinforced the responsibility of regional CEOs for business strategy, business development, risk management, optimization of various platforms including recruitment and compensation, as well as ensuring compliance with respective local
regulatory requirements.

**Changes in the design of the Management Control System**

There were changes to all four levers of control (Simons, 1987). Belief systems appeared to have been used to try and change the culture to overcome the crises. In May 2008, EuroFinance introduced more formal belief systems to provide employees with a more formalized framework for their activity aimed to develop the operational risk management culture across the organization. Principles promoted included values such as personal accountability, discipline, rigour and transparency around an accepted ongoing people focused value “our people are our strength”. They organized training initiatives and encouraged managers in Foreign Business Units to cascade the message to all staff based on the Head Office materials. Unsurprisingly, belief systems did not permeate all business units and were a one-off event at the Regional Office in Hong Kong. The idea of an innovation prize did bring one important aspect into broader consciousness.

Boundary systems was evident in the introduction in 2008 of a staff handbook, which set out the appropriate code of conduct, specified the applicable compliance rule, internal and external regulations, the rights of employees, roles and responsibilities and block leave clearance. All staff were required to acknowledge receipt of the handbook on yearly basis. In addition, they also defined the Internal Control policy to measure unauthorized transactions and identify fictitious deals.

Boundaries were created in this banking environment by internal control structures. New internal control monitoring was implemented to correct the weaknesses evident in the internal crisis. For example, there was improved IT security with frequent changing
of passwords and checking access. Management alert indicators were introduced. Additional controls and limits were imposed including monitoring daily transactions to identify fictitious deals and prevent unauthorized transactions. EuroFinance implemented stronger segregation of duties, created a team responsible for seeking fraudulent transactions and malicious behaviour. Management introduced a new tool, “Personal Organization Provisioning Service”, to manage identities, activities and resources of the staff in areas where it could help to reduce operational risk with minimal access allocation. It was also intended to improve efficient handling of department changes and terminations, more rigorous monitoring of leave clearances and staff behaviour.

In relation to diagnostic control systems, EuroFinance rolled out a change management program to cultivate a culture of accountability, discipline and mutual respect and reduce fraud risk. A new model for performance appraisal for the staff in late 2009 aimed to focus on actions and behaviours to achieve the results. Increments and bonus allocations were based more tightly on annual objectives; designed to capture organizational attention and commitment to the new strategy. While good in theory, the Asian business units had no direct link between the compensation and the achievement of the objectives. The Regional Finance department implemented career management dashboards which were monitored on a quarterly basis and monitored achievement against target and other factors such as staff mobility, personal development plans, employee turnover and career interviews.

An important response to the crisis was the focus in 2009 by the EuroFinance CEO on a new standardized performance measurement system based on regional rather than
business line performance. He wanted daily regional results and tracked regional business line's daily performance which was accompanied by a new dashboard and reporting format. Head Office also organized quarterly meetings between regional top management for the presentation and discussion of the regional results including the implementation of the outsourcing strategy. This was rolled out throughout Asia with some degree of adaptation although Head Office was involved in shaping and designing the report template to be used for monthly and budget presentation. As a result of the crisis, the Head Office moved back to trying to achieve more control.

In relation to budgets, the bearish economic situation produced in 2008 a much tighter top down approach with stringent control on both headcount and costs\(^1\). Head Office decided cuts in headcount and costs and allocated the cuts by location without discussion; including some closures and the scaling down of some Asian Foreign Business Units. Headcount was particularly tightly controlled by Head Office; any exceptions required their approval.

In the next year, the Head Office persisted with a top down budget process but used meetings for arbitration to give some power to Regional Offices. There were discussions to make sure that the Head Office figures reflected the expectations of the regional team and the Regional team understood the allocation by Head Office. Control of head count and budget costs was largely still top down; this was seen as essential in controlling costs through the crisis. This created an issue for some local FBUs as they were not sure how to work within the assigned budget.

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\(^{1}\) This may support the conclusion that “hostile and turbulent conditions appear, in the main, to be best served by a reliance on formal controls and an emphasis on budgets” (Chenhall, 2003, p.138).
The need to bring about change from 2008 to 2010 led Head Office to launch several projects such as the re-organization of the business lines and support functions in mid-2008, a cost containment project rolled-out to Asia in 2009, a report standardization and streamlining project of 2009 to achieve process efficiency and excellence, new performance appraisal tools in late 2009, and outsourcing initiatives to save cost and headcount in all regions. In addition, Head Office centralized a standardized transfer pricing agreement to optimize taxation arrangements. This continuous roll-out of new projects showed a determination by Head Office for rapid change, and the management control systems were an essential element in this process.

The same spirit was adopted in the regions. The Asian Regional Office’s finance department launched new project management systems and created a plan for shared services in the Regional Office in line with the EuroFinance outsourcing strategy as a pilot for the whole organization. The Regional Office matched the focus of Head Office launching projects such as a ‘cost saving’ project, the ‘Reorganization’ project to track the implementation of the re-organization of the business lines and support functions, transfer pricing project to copy the initiative of the Head Office, a project to streamline the dashboards, a roll-out of the Head Office standardized reporting and implementing of the outsourcing strategy.

In terms of interactive control, there was an increase in communication after the internal crisis explaining the situation and reassuring the employees that there would be no dramatic shift in strategy. The message was on staff support to rebound together while providing excellent service to the clients. In 2009, following the internal and
external crises, more visits were made to Asia by EuroFinance CEO and global business unit heads to meet with the clients, regulators, and have an all staff town hall meeting. The Regional CEO seemed to increase focus on performance measurement, and used it interactively on a monthly basis through all staff presentations. He met regularly with the Regional Office business line heads to discuss progress of revenue generation and travelled to Asian FBUs, to meet with clients and all staff.

More linkages in EuroFinance became common. For example, in Feb 2009, the Head Office invited the Asian Regional team to an announcement of a Head Office project to understand and participate in the global process roadmap, and established governance by linking Head Office and Regional Office. This increased Regional Office involvement in objective setting and defining the implementation action for the year.

Increased interactive controls can be seen in the regular meetings becoming a more constant feature of the EuroFinance landscape to draw in more knowledge of the external landscape. The new CEO enlarged the executive committee with the involvement of EuroFinance CEO, regional CEO, EuroFinance SBUs heads for results review and follow-up, strategy discussion and implementation, and business opportunities discussion. The CEO increased the frequency and strategic focus of meetings with selected staff, seminars with managers to discuss strategic items and town hall meetings. Regular meetings with FBUs managers aimed to obtain free flow of information and there were also meeting with external parties such as clients, competitors, consultants. The regional CEO aligned regional meetings with Head Office and organized and enlarged his executive committee. The Asian regional COO also organized meetings with support function heads to discuss business opportunities,
follow-up results achievement and regional project follow-up. Regular conference calls were organized between Regional Office and FBUs for update of progress and news.

Another example of interactive control development in the Asian region was an annual seminar organized by the Regional Office to share project planning and the annual roadmap. In Dec 2009, for example, the Asia Pacific regional manager’s annual seminar included the EuroFinance CEO, EuroFinance SDUs heads, location managers and regional managers. There was benchmarking of the firm with other competitors, and an invited guest speaker from a competitor to provide their view of EuroFinance and how it can improve. The vision and 3 year targets were presented and all participants were asked to come up with three key success factors for each business line and resource function.

EuroFinance's new CEO and COO, who had extensive experience with ‘Anglo Saxon’ firms, replaced a few senior positions in both Head Office and Regional Office with people from their previous Anglo-Saxon firm. In addition, they seemed to push very aggressive changes in EuroFinance's processes with the intention to bring an ‘Anglo Saxon’ culture to EuroFinance including tough team roadmaps with short completion times. This move to push for a change in culture as a way of bringing change was not entirely successful as the push for an ‘Anglo Saxon’ culture seemed overshadowed by a ‘Latin Europe culture’. A year after they were on board, the CEO and COO seemed to ameliorate their aggressive approach with shifts in their rhetoric, the project roadmap and their drive for change.

In general after the crisis, the head office team respected the boundary systems and
executed the controls accordingly. However, the head office team did not feel the need to reinforce the belief systems, as they believed that there was a sharing of the values of professionalism and innovation.

**Informal controls**

Informal controls had been a strong part of the EuroFinance approach before 2008. Relationship building was important, especially knowing the right person at the hierarchy level was essential to get things moving in EuroFinance and to secure a position. In EuroFinance whenever there was an open position it will be filled immediately by candidates closely related, or by person recommended by the manager at the top hierarchy. Relationship building was essential to get insider information, gain cooperation and quick response across FBUs, Head Office and functions. Less formalized structure and detailed procedures empowered staff to find the best way to carry out the tasks, which enable the organization to react effectively and efficiently upon urgent request.

**External Crisis in 2011**

Bifurcation points follow each other. EuroFinance rode through the disturbances in 2008, with an appropriate strategy, and remained profitable after the crisis. However, in mid-2011, EuroFinance was struggling with the European banking problems and with the external crisis and not able to meet forecasts by the end of 2011. Faced with slow economic growth, the outlook for EuroFinance was negative; there was a major imbalance between revenue and costs. In order to maintain its profitability, EuroFinance focused on controlling its expenses, defined a cost control policy, and
pushed the implementation of the outsourcing strategy to achieve the targeted cost and headcount.

Budget 2012 targeted drastic cost reduction and stopped most of the projects. Staff in Head Office, and some FBUs, were encouraged to opt for early voluntary retirement. The Head Office team worried that there would be a headcount cut in France for the first time and there was speculation that that might happen after the French president election. Head Office announced changes in the top management and organizational structure as the Global CEO decided to leave EuroFinance at the end of 2011.

While the belief system did not change there were significant changes to the diagnostic control systems. Cost controls were tightened. An example was where there was a new policy to stop reimbursement of some expenses; approval by exception by top management still prevailed. Reports generated and tracked the expenses incurred by staff. Meetings were organized for information sharing and interactive use of accounting data, and these included decisions on how to control the expenses.

Another diagnostic system which changed was the project management system with Head Office pushing for an outsourcing strategy, and regions like Europe and Asia had dedicated project teams to implement the outsourcing strategy with US lagging.

6. Discussion

Management control systems may be very useful in relatively stable situations, up to the bifurcation point. Diagnostic control systems like budgeting and variance analysis and performance measurement systems are able to report minor variances and managers
take action where appropriate; management by exception appears to work. The primary focus in this paper is, primarily, beyond equilibrium where these systems may not be effective. It should be considered, however, that at low levels of disturbance the management control systems may be hindering the preparation for more dramatic change.

It has been considered that at the bifurcation point the organization will go through experimentation to resynthesize. Drawing energy, renewal, sometimes through management control systems, may see an organization or network emerge in a different unintended state. While Leifer's circle suggests that the alternative of destruction comes through denial, this is not always the case. The cause of ultimate disintegration may be the impossibility of an organization to change due to the nature or amount of the energy it would need to draw in. At this point the reification of “organization” needs to be faced. The disintegration of ETSA was a political decision by its political stakeholders who had sufficient votes to push the change through state legislature. While those “within” the organization may well be able to experiment to allow dramatic change, external heat sources instead of creating new patterns may bring about disintegration. Denial may not feature – there may be active attempts to recognize the change. From this viewpoint, investments in management control systems which are subsequently abandoned, as happened at ETSA, are not necessarily wasted resources. They may in fact help the smoothing of external turbulence. The problem is when these systems do not provide the impetus to more dramatic changes needed in the organization.

Prigogine’s theory as connected to management control suggests that periods of dramatic change are not necessarily destructive. Organizations can renew and draw in
energy to move to higher levels of organization. More common is the spinning out of control into destruction. This sort of change is rarely considered in the change management literature but is all too common in the type of dramatic events like the Global Financial Crisis (GFC). Crisis is an enabler of the change necessary for renewal and moving to higher order,

EuroFinance is an example of an organization that used early shocks to draw energy from new managers and systems and move to a better mode of operation. Informal control systems were strengthened by more formal systems which enabled better monitoring of risks. Once the GFC hit, the organization was more able to withstand the crisis because of strong organizational learning. Having gone through the stages indicated in the Leifer circle it returned to “far from equilibrium” when the GFC struck. The next stage or reframing and change was not as dramatic but even higher amounts of skill and ideas were needed for an even more advanced dissipative structure. This paper manages to draw out different responses across the organization as Head Office tried to keep the whole tracking positively. One of the problems with Prigogine is that not all the particles in a Bénards cell need be at the same state of disorder depending on the energy being put in across the plates. Yet organizations can fail because of disorder at a single point, especially financial institutions. Trying to move the whole organization to a higher level of organization and drawing energy from management control systems may be highly problematic.

7. Conclusions

Prigogine’s theory has been a useful device for exploring management control systems at points of dramatic change for organizations, the bifurcation point. While MCS may
have little impact on organizations spiralling downwards to destruction, they may well be part of the information and energy that an organization draws in to move to a dissipative structure. A problem with this analysis is the reification of the organization and its treatment as a singular system when Simon’s (1962) initial focus was on hierarchy and parts of the system. The complex interactions within the organization are ignored in order to focus on the condition of the whole system.

There are more fundamental concerns about Prigogine’s theory as a means of extrapolation from natural systems to human organization. In particular, Goldstein questions the level of emergence and self-organization that is found in Prigogine’s experiments: “given the right container, and the right liquid, and the right process of heating, the Bénards convection cells will emerge, and their patterns will be quite similar to those observed in previous experiments”. (Goldstein, p.72). Rather than just expecting random results, there will be patterns. In human systems and organizations, researchers need to be seeking the patterns that organizations might show at the bifurcation point and cases where there is a development of dissipative structures.

This brings into focus the limitation of having only two cases which is insufficient for generalizability about patterns. A longitudinal case study, with high resource demands, is not a common research design, possibly due to the perceived efficiency of faster theory testing using cross-sectional data. While Burgelman continues to build processual theory in strategy using long-term analysis of a single company, Intel, this approach is not particularly welcome in management control systems. Yet Apple, with the highest stock market valuation in history, is a company which has met serious bifurcation points in the past with little research of whether management control
systems may have contributed to this resurgence, if at all. However, both cases were longitudinal cases which are very intensive in research demands.

While studies of how accounting is implicated in change processes continues, it is useful to look to models of more dramatic change such as Prigogine. The role of management control systems in rapidly changing organizations is a subject for continuing research although few scholars will find the time for longitudinal research. Specifically, the claimed advances in management control approaches, such as the balanced scorecard, need to be scrutinized from the world of complexity where unintended or unexpected consequences are the usual.
References


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