RESILIENCY MANAGEMENT WITHIN A GLOBALLY INTEGRATED ECONOMIC NETWORK

Richard V Weeks: Graduate School of Technology Management, University of Pretoria

Purpose: The purpose of this paper is to gain an understanding of resiliency management within a turbulent globally integrated economic network.

Problem investigated: The South African economy functions as an integrated component of the global economic network, one that is highly competitive and extremely turbulent in nature. The current subprime initiated economic meltdown and the impact thereof on South African government, business and industry institutions serves as a case in point. The question posed is one of how best to manage institutional resiliency within such a complex environment.

Methodology: A literature study is undertaken and a narrative enquiry conducted by means of open ended discussions with fourteen South African managers on an individual basis to determine the impact of the economic meltdown on South African organisations and the nature of resiliency management in response thereto. The approach adopted is intentionally analytical-descriptive in nature. The narrative enquiry constituted open ended discussions with managers in order to learn from their personal experience in resiliency management. In view of the sensitive nature of the discussions and to get a more reliable reflection of the true situation that exists they were conducted on a basis of anonymity.

Findings: An important conclusion drawn from the study is that the culture and climate of the institution play a very fundamental role in resiliency management. Nurturing a culture of "resiliency awareness" is deemed to be a vital aspect in dealing with the emergent consequences of sudden, unexpected and unpredictable events such as the subprime economic meltdown.

Value of the research: Seen within the context of a prevailing highly turbulent and unpredictable globally networked economy, the insights gained from the study could assist executives and managers in exploring alternative means of engendering institutional resiliency.

Conclusion: Resiliency management embodies both a proactive and a reactive approach, each of which inherently have organisational culture and climate implications. The nurturing of a culture of "resiliency awareness" is found to be a vital ingredient in managing institutional resiliency in the face of unprecedented, unexpected and unforeseen events that have a significant impact on the institution and its operational activities.

Key words and phrases: Resiliency management; organisational culture and climate; a culture of "resiliency awareness"; complex adaptive systems.

INTRODUCTION

Globally integrated economic networks engender a context of delicate complex stability that small, unforeseen and often unexpected occurrences can shatter, leading to a cascade effect of events that can place institutions, communities and even nations at risk. This reality was very recently clearly demonstrated by the subprime economic meltdown that brought the global economy to the very precipice of cataclysmic collapse. Few people, organisations and governments have not experienced the effects thereof and it raises the question of how they can engender a sense of resiliency to navigate these turbulent conditions. This paper is directed at finding an answer to this question by means of a literature and a narrative enquiry based research study. The research study on which this paper is based may be termed to be analytically-descriptive in nature. It attempts to inter alia learn from managers' personal

experiences, insights and views in having to deal with such unforeseen events that have a very turbulent effect on their institutions and communities.

The narrative enquiry essentially consisted of open ended discussions with the managers concerned in order to learn from their personal experience in resiliency management. In view of the sensitive nature of the discussions and to get a more reliable reflection of the true situation that exists, the interviews were conducted on a basis of anonymity. In order to therefore not compromise the reliability of the study a literature study was conducted to substantiate the insights gained from the narrative enquiry.

With this as background, a brief analysis of environmental complexity is presented in the paper, with reference to determining the need for nurturing resiliency awareness. The concept "resiliency" is thereafter clarified. This brief introductory discussion in effect provides background information for the rest of the paper, namely an analysis of the globally integrated economic network, resiliency as a response to economic contextual complexity and the need for resiliency awareness. Insights gained from interviews conducted with management practitioners and a literature study informs the motivation for the need for a culture of resiliency and the nurturing of such a culture is then explored in greater detail.

INCREASING ENVIRONMENTAL COMPLEXITY AND THE CONCEPT OF RESILIENCY

"*It is clear that the new world is more complex and more difficult to manage than that to which we have been accustomed*"

Alex and David Bennet, 2004:xi

"*Enterprise resilience is the ability and capacity to withstand discontinuities and adapt to new risk environments*"

Randy Starr, Jim Newfrock and Michael Delurey.

The introductory quotations attest to increasing contextual instability and the need for institutional resiliency in adapting to what is termed to be new risk environments. Bennet and Bennet (2004:5) describe the prevailing *"environment and the context within which current organizations must compete, survive, and thrive"* as one where*: "Time accelerates. Distance shrinks. Networks expand. Information overwhelms. Interdependencies grow geometrically. Uncertainty dominates. Complexity boggles the mind".* In a similar sense Bell (2002:2) describes it as "*a decade of unprecedented change, wrenching economic instability and business discontinuities that demand organizational agility and organizational resilience*". The description is certainly one that many executives and managers, confronted with the prevailing economic meltdown in an integrated globally networked economy, will be able to associate with. It is also a description that to say the least is rather disconcerting. The accent place on institutional resiliency, adaptability and agility is therefore also not all that surprising. It, however, does imply a need to determine what constitutes institutional resiliency in the face of such a disconcerting description of the environment in which institutions currently function.

A recurring theme that emanates within the literature is the notion of reactively responding to an unforeseen occurrence by so called "bouncing back" and "adapting" (Denhardt and Denhardt, 2009; Van Opstal, 2007:6; Weick and Sutcliffe, 2001:2). In contrast one would have thought the accent aught to have been one of being able to proactively detect and respond to emerging situations or events that were occurring. The answer to this is most probably embodied in Weick and Sutcliffe's (2001:2) suggestion that managers are not all that skilled in dealing with extremely unsettling situations and they consequently contend that events therefore spiral, get worse and disrupt the operations of the institution. Clearly insinuated therefore is a reactive response in dealing with disruptive events that impact on the operational activities of institutions.

The problem associated with a reactive stance is that it can well lead to loss of life and in some instances the very demise of the institution itself if it fails to effectively deal with the disruption to its operations. The Challenger and Columbia space shuttle tragedies as well as the Chernobyl nuclear reactor meltdown are typical such events that went undetected and resulted in a significant loss of life. The fact that the area surrounding the Chernobyl reactor site still lays deserted and uninhabited, bears silent witness to the lack of a proactive resiliency and an inability to deal with the situation that emerged at the time in question. In most instances where such profound events occurred, resulting in a loss of life and in instances having a devastating impact on the communities concerned, an investigation was launched to determine what give rise thereto. Interestingly enough they reveal a trail of occurrences that either went undetected or that were assumed to be in the realm of acceptable risk. It would seem to suggest the total absence of a culture of "resiliency awareness". In this context and for the purpose of this paper "resiliency awareness" is defined as *the nurturing of cultural attributes that instil behavioural determinants within an institution, community or an entity that enable the people concerned to detect, make sense of and appropriately react to emerging trends, patterns or weak signals that could give rise to events that would significantly impact on the entity concerned.* Kerby (2000:1) asserts that if one were to ask workers involved in the Chernobyl disaster whether another incident could occur the resounding answer would be "never". Implied therein is the notion of having learnt a lesson from the tragic event. Yet a mere few years after the Challenger disaster history was to repeat itself with the Columbia space shuttle tragedy, accompanied once again with significant loss of life.

Underpinning the difficult of being able to predetermine the emergence of events, based on an identification and analysis of emerging trends that could give rise thereto, is what Snowden and Boone (2007:469) refer to as the phenomenon of "retrospective coherence". They claim that "emergent patterns can be perceived but not predicted" (Snowden and Boone, 2007:469). Yet once a pattern has stabilised, its path retrospectively appears logical and people find it difficult to see why the persons involved had not taken appropriate corrective action to prevent its occurrence. Adopting a similar perspective, Stewart (2002:4) claims that "with hindsight, for example, the malevolent lines leading to 9/11 are clear, but it would have taken pure luck to see them beforehand". Advocated therefore is the view that while the trends or patterns that gave rise to the events could retrospectively be determined, at the time in question the outcome thereof merely constituted conjecture with no real ability or substance to accurately predict the actual events that occurred. In line with this reasoning a number of alternative outcomes, equally devastating or far more favourable could have materialised from actions that may have been taken by the persons involved during the Chernobyl incident. The sheer number of such potential scenarios, taking all the alternative cause effect relationships that could arise into consideration, would have apparently simply overwhelmed their ability to analyse all of them. What was therefore possible retrospectively was a pure impossibility at the time preceding the incident.

In complex contextual situations a large number of eventual outcomes are possible, depending on the nature of the interaction that takes place within the networks that constitute the system. The large numbers of networks that constitute the global economy are in all probably indeterminate. The interaction that takes place and the effect thereof will certainly be very rich and extremely complex in nature. It is the collective influence of all of these interactions which eventually converge that brings into being events such as the current subprime mortgage initiated economic meltdown. It is not individual actions that took place per se, but the convergent flow of events through all the interrelated economic networks that in the end resulted in the meltdown of the global economy.

THE CONCEPT RESILIENCY DEFINED

Seen within the context of the preceding discussion, McManus, Seville, Brunsdon and Vargo's (2007:ii) ensuing statement with regard to resiliency assumes very definite relevance, namely:

"Resilience is a function of an organisation's: *situation awareness, management of keystone vulnerabilities* and *adaptive capacity* in a complex, dynamic and interconnected environment*."*

The definition attributed to resiliency assumes that the environment is complex, dynamic and indeed extensively interconnected. Determining the flow and convergence of cause effect relationships stemming from the numerous systemic interactions taking place within such an extensively interconnected environment it seems would be indeterminate. Consequently the accent, in terms of the definition, is on managing the associated vulnerability the institution experiences, as well as its capacity to deal therewith. The basis on which this is done is one of situational awareness. The researchers conclude that the means of achieving increased resiliency awareness includes inter alia "semi-formal, open ended interviews, surveys, reporting of observations back to the organisation and brainstorming hazard events using consequence scenarios" (McManus, et al., 2007:ii). Snowden and Boone (2007:75) concur that complex contexts require more interactive communication than any other context. They advocate the use of large group methods or interactive, multidirectional discussion sessions for determining how best to proceed within a complex context.

McManus, et al (2007:ii) suggest the use of scenario based self-assessments of institutional vulnerability and ability to adapt, as a possible means of facilitating resiliency. It is an approach that assumes that cause effect relationships can be determined. Without such ability the scenarios would be meaningless. The difficulty with this in practice is that the scenario that materialises may not have been envisaged at all, as could well be the case in the context which they describe. Described is a context where numerous systemic interactions take place, anyone of which could result in a convergence of a totally different scenario to that contemplated and analysed. Clearly this will seriously compromise the institution's resiliency.

In extremely chaotic situations cause effect relationships break down and for all practical purpose it therefore becomes near impossible to predict any outcome until it materialises. The immediate post 9/11 situation that unfolded in New York serves as a good example of such a situation. Snowden and Boone (2007:75) note that though the events of 9/11 were not immediately comprehensible, the crises demanded decisive action. The situation itself is not unlike many similar extremely distressful and anxiety generating situations that have confronting executives managers and communities over time and many similar situations could therefore be cited. Of interest in this instance, however, is the success Rudy Giuliani achieved in demonstrating and instituting decisive action. It engendered a sense of resiliency and an ability to bounce back in the face of a very complex situation that had materialised. It would seem that it was one which few, if any, executives or politicians had seriously considered as a scenario that could materialise prior to the event itself.

A distinction is made in the preceding discussion between cause and effect relationships that exist within complex and chaotic contextual conditions. The former suggests that the relationships may retrospectively be determined, while the latter assumes that no such relationship exists at all. Each as we have seen has an influence on what constitutes resiliency awareness. Both the contexts described are non-linear in nature, thereby implying an inability to predetermine the actual outcome with any degree of certainty. This in turn will give far greater credence to a reactive connotation of resiliency awareness. In contexts where cause and effect relationships are linear, possible outcomes can also be predicted and the scenario approach, as advocated by McManus, et al (2007:ii) could in fact be quite plausible. It will also resonate with a far more proactive connotation attributed to the concept resiliency awareness. The need to determine the nature of the context that exists is therefore important, in determining whether a proactive or reactive resiliency awareness stance would be more appropriate.

A GLOBALLY INTEGRATED ECONOMIC NETWORK AND ITS IMPLICATION IN TERMS OF INSTITUTIONAL RESILIENCY

"Columbus reported to his king and queen that the world was round and he went down in history as the man who first made this discovery. I returned home and shared my discovery only with my wife, and only in a whisper. 'Honey', I confided, 'I think the world is flat'."

Thomas Friedman (2006:5)

The rationale underscoring Friedman's (2006:5) rather dramatic conclusion is one of a global network of system interaction and integration. The dot-com bubble sparked a huge overinvestment in fibre-optic cable networks that spanned the world and drove down the time and costs associated with information transfer (Friedman's, 2006:71). Innovative technologies emerged that over time has significantly enhanced the speed and capacity utilisation of the fibre-optic cables that had been laid. Innovation upon innovation in the use of these cable networks resulted in the emergence of a host of networks and systems, some of which spurned what has been termed to be the knowledge economy and also as of late the services economy. The shift to services as a key driver of global economic activity and growth has important implications, as in many instances these services constitute networks of global interaction between institutions and also between institutions and clients.

Currently services account for over 60% of many countries economic activity, and more specifically in the case of South Africa 65% (Weeks & Benade, 2008:209). The result is what may be termed to be a "flat world services economy" or one of extensive networks of services and economic interaction. As the world became more digitalised so the economy of countries became more enmeshed within what for all practical reasons may be termed to be a globally networked and interconnected economy. It is suggested by Merali (2008:285) that "*the dynamic of emerging (information and technology, social, organisational, economic and political) networks confronts institutions, societies and nations with unprecedented complexity and new choices and challenges for modes of existence, organization, competition, collaboration and survival"*. Within the context of this paper, it is suggested that this translates into a need for institutional resiliency to deal with the complexity of the emergent network convergence confronting modern-day institutions. In this regard it is interesting to note that Alicia Juarrero (2009:1) claims that "complex adaptive systems teach us that resilience is more important than stability: resilient organisms withstand perturbations, adapt, and survive. To do so, however, they cannot be separate and closed off from the world: they must be open to and interact with their environment".

Within a globally interconnected economy, during 2004-2006, one of the main potential threats to the world economy centred around the global financial imbalances arising from the chronic and rising US current account and fiscal deficits (Watanagase, 2008:1). It is specifically noted by Watanagase (2008:1) that although most economists believed that the situation was not sustainable, no one could predict the timing and extent of the unwinding process, nor whether the US would face a hard on soft landing. The current global economic meltdown, unfortunately, manifests an abrupt unwinding of the imbalances (Watanagase, 2008:1). So enmeshed has the global economic networks become and at the same time so interdependent that small initial events, such as the subprime mortgage crises, give rise to far greater unforeseen and unexpected outcomes. This is clearly manifest in the global economic meltdown, where the initial wave of mortgage foreclosures that took place in the United States has resulted in a tsunami that has engulfed the global economy. This in effect characterises the globally networked economic system as being one that is "complex" in nature. In this sense the categorisation of the system as being "complex" has very definite resiliency implications.

In a more academic context the term used would be that of a "complex adaptive system". It is according to Bennet and Bennet (2004:26) composed of a large number of components, such

as individuals, groups and entities that have nonlinear interaction and the capability to make local decisions and strive for specific end states or goals. It is further stressed by Bennet and Bennet (2004:26) that these components build many relationships both within organisations and external to the organisational boundaries that may become highly complex and dynamic. The description provided would seem to resonate on a broader basis with what we term to be a globally networked economy. It is the nonlinearity referred to that is of specific pertinence as it implies unpredictability. The following statement by Bennet and Bennet (2004:26) is also quite pertinent in terms of this paper:

> "Our finding in the research on complex adaptive systems is that they have the ability to exist and operate in a state that is between pure stability and complete instability in a region that contains both stability and instability"

Citing Ralph Stacey, Bennet and Bennet (2004:26) continue to suggest that when information flow, connectivity, degree of diversity, level of anxiety and power differentials become to intense the system may be pushed into saturation, confusion or chaos, leading to an inability to respond. This it would seem would be the case in some of the preceding examples referred to, namely the subprime initiated global economic melt down, the Challenger and Columbia space shuttle tragedies and the Chernobyl disaster. It is indicated by the researchers that in facing non-routine situations, such as referred to here, "*making good decisions and taking effective actions each require knowledge; information alone is not up to the challenge when uncertainty, ambiguity, and nonlinearity dominate the landscape*" (Bennet and Bennet, 2004:29). Within the context of this paper knowledge is implied to embody an element of "resiliency awareness". It is interesting to note that Bennet and Bennet (2004:2p) claim that to survive and compete in the future world institutions need to "*possess a number of emergent characteristics that taken together result in resilience, agility, adaptivity, and learning, all well-known traits of survival*".

From the above discussion the picture that emerges of the global economy is one of a host of interconnected and interacting economic systems, any one of which can give rise to a cascade of nonlinear cause effect relationships, the outcome of which at best can only be retrospectively determined. So complex is these integrated networks that in all reality it would be practically impossible to predetermine the effect that any single event on the total system. The feedback systems are numerous and any nonlinearity may result in unexpected consequences. It is a realisation that could have possibly resulted in Watanagase (2008:2) claiming that a "*common and frequently asked question is whether further integration at both the global and regional levels, especially financial integration, should be deterred as it has created channels that allow a financial crisis in one country to spread to various parts of the world*". Watanagase (2008:2) concludes that "*while we see significant adverse impacts of global integration, Asian economic integration, in fact, has a crucial role in helping a number of our regional economies withstand this enormous external destabilizing shock. Hence, our essential tasks are about determining an appropriate pace of further integration and making us increasingly resilient in response to the fast changing environment*" The key issue here is therefore one of engendering resiliency in response to the flow of consequences emanating from an integrated globally networked economy. The ability to predict specific outcomes, such as the current economic meltdown, and the effect thereof on institutions, governments and even regions of economic activity are considered to be just too great a challenge. Equally, as seen in the case of Zimbabwe, when economies become decoupled from global economic networks they do not necessary become more resilient, they tend to stagnate and stagnation in terms of complex systems theory equates with death in an ecological sense.

It is certainly interesting to note that in retrospectively analysing the flow of cause and effect relationships that have resulted in the prevailing global economic meltdown, a number of interventions are now being considered that if they had been in place may have resulted in a negative feedback system that would consequently have resulted in greater stability. They are referred to as being lessons learnt (Watanagase, 2008:3-4). So for instance G7 Ministers and Central Bank Governors, in 2007, requested the Financial Stability Forum to undertake an

analysis of the causes and weaknesses associated with the prevailing economic turmoil and provide recommendations for increasing the resiliency of markets. The research findings indicated that to re-establish confidence in markets and financial institutions steps had already been taken that include inter alia that of "*monetary and fiscal stimulus, central bank liquidity operations, policies to promote asset market liquidity and actions to resolve problems at specific institutions*" (Financial Stability Forum, 2008:1). They further discovered that *"despite these measures, the financial system remains under stress*" (Financial Stability Forum, 2008:2). It was also concluded that while national authorities may continue to consider short-term policy responses to restore confidence in the soundness of markets and institutions; it is essential that steps be taken to enhance the resilience of the global system (Financial Stability Forum, 2008:2).

Resiliency as a response to economic contextual complexity

From the preceding discussion it would appear that institutional resiliency has a very pertinent role to play in dealing with the instability associated with global financial networks. If one, however, considers the extensive list of suggestions made to enhance resiliency, they are essentially systemic interventions that do not address the issue of a need for establishing a sense of "resiliency awareness" in the hearts and minds of the people concerned. They largely constitute recommendations relating to the need for new policy, procedure and practices, therefore systemic interventions; this while they have just noted that despite previous such measures the financial system still remained under stress. It would seem to imply that the interventions deemed appropriate in a context where cause and effect relationships were linear and could be determined, were largely ineffective in dealing with a context where such relationships were complex, nonlinear and at best could be retrospectively be determined. It is advocated that a more effective alternative could be to adopt a complex adaptive system approach in dealing with the intricacies of a complex, nonlinear, and extensively interconnected global economic network.

Snowden and Boone (2007:74) suggest that instead of attempting to impose a course of action in complex domains, leaders need to patiently allow the path forward to reveal itself. They therefore advocate a need to first probe, sense and then respond. It is noted by the researchers that of primary concern is the temptation to fall back into traditional command-and-control management styles, as leaders don't recognise that a complex domain requires an experimental mode (Snowden and Boone, 2007:74). They categorically state that "*leaders who try to impose order in a complex context will fail* " (Snowden and Boone, 2007:74). The current track record of governments, central banks and world financial agencies, in addressing the global economic meltdown, it would seem has not to date been all that impressive. At the time of writing this paper the jury is still out as regards the outcome of the Obama administration's $787 billion fiscal stimulus package intended to kick-start the economy. It may therefore be an appropriate time for South African institutions to engender a sense of resiliency awareness within their institutions, so as to be more effectively positioned to deal with the fall out of the current initiatives being implemented.

A NEED FOR RESILIENCY AWARENESS: INSIGHTS GAINED FROM INTERVIEWS CONDUCTED WITH MANAGEMENT PRACTITIONERS

It needs to be stressed from the start that the discussions held with managers in the course of the research for this paper was never intended to produce quantitative information, but merely centred on gaining an insight into the perceptions people held in terms of what constituted resilient awareness, particularly as it related to the impact of the current economic meltdown on their institutions operational activities. Open ended discussions were held with fourteen South African managers from institutions ranging from very large to small to medium sized enterprises (SMEs). Also included were three managers from public sector institutions. The analysis thus in essence constituted a narrative interpretive approach to determine emergent trends and insights. The discussions revealed a diverse connotation as to what resiliency awareness

entailed. The size of the institution also played a significant role, the smaller the institution concerned the greater the awareness of the financial effect of the economic meltdown on the institution's operations. In discussing resiliency awareness within a global economic meltdown context, the managers from the public sector institutions reflected to a lesser degree a sense of resonance thereto, as it did not directly impact on their operational worldview.

In a few instances the initial connotation to resiliency was one of contingency and business continuity planning, which essentially related to the institution's information technology infrastructure. The literature research revealed a similar trend, as may for instance be seen from Gaddum's (2004:1) assertion that: "*Business continuity has been focused upon a defensive resilience posture, consisting of three basic building blocks - recovery, hardening and redundancy – that are widely recognised as vital ingredients for successful business continuity plans*". From the interviews conducted with managers it become apparent that in quite a few instances it would appear that although some form of business continuity planning had been undertaken, testing of the plan was not a frequent occurrence. The disruption to the institution was cited as a typical reason for not frequently conducting live tests. On a more personal note respondents appeared to be aware of the need for a regular backing-up of data on personal computer hard drives, but in many instances claimed that it was only done on a less than frequent basis. Most of the managers attributed a connotation to the concept "resiliency" in terms of their managerial field of responsibilities. In the case of the smaller SMEs resiliency tended to resonate with managers more directly in relation to threats posed to the future survival of the entity concerned and thus the relevance of the discussion relating to the financial impact of the economic meltdown on their institutions operations.

Mention of the economic meltdown generally resulted in a wider contextualisation of resiliency awareness, as a concept and resulted in a change of focus towards trends that essentially centred on reactive initiatives to deal with the existing consequences that were negatively impacting on the institution and to a more limited extent on expected or envisaged consequences. Asked as to their resiliency awareness in dealing with the consequences of the meltdown, the typical response was one of a curtailment of operations and cost reduction in order to ride out the storm. It is a response also encountered in the literature study, as may be seen from Tobi Cohen's (2009:1) report on the shutting down of Rio Tinto Alcan's Quebec smelter. In some instances the storm implied a significant reduction in the institution's revenue generating capability and a very definite reduction in profit margins. In no less than half of the discussions with managers from SMEs, it was indicated that revenue income had dropped by over 40 % during the last part of 2008. Resiliency in this sense equated to cost curtailment and a balancing of the budget. This was particularly the case in SMEs operating within the building and construction, tourism, real estate and motor dealer sectors of the economy, which it appeared were in particularly operating under stringent financial constraints as a result of a dramatic decrease in new business and sales revenues. . The degree of flexibility that existed to curtail costs depended on the extent to which fixed costs were involved. Two of the people concerned indicated a diversification strategy of operational activities in order to engender a degree of resiliency, as the fixed cost component of their business activities was quite high.

Most of the managers with whom the concept of resiliency was discussed indicated that it was virtually impossible to consider all of the potential scenarios that could arise and formulate strategies to deal with each of these. The notion of being able to rapidly respond to those that were likely to have a significant impact on the operations of the institution was considered to be a more meaningful approach. They, however, indicated that key contingencies such as disruptions to the institution's IT infrastructure needed to be considered and planned for. In a few instances consideration had been given to the sourcing of materials or other essential items used in their operations from alternative suppliers as they had in fact at some stage in the past experienced difficulties in this regard. It was therefore a case of having learnt from experience. Most had not really adopted a very extensive analysis of the complete supply chain external to their institution. A lot depended on the relationships and trust that had been established over time with both suppliers and clients. This was particularly the case where

services were involved, as the option of keeping stock to deal with unforeseen supply difficulties clearly did not exist in this sense. Generally there was agreement that communication and the nature of the interaction that took place played a critical role in this regard and therefore had an influence in engendering a sense of resiliency.

The trend emerging from these discussions was therefore more of an operational assessment of resiliency. Very few had really considered doing "horizon scanning" on a more formal basis as a means of adopting a more proactive stance. Issues tended to be dealt with as they arise and are expected to impact on the institution and its activities. The resources to be able to conduct a far wider horizon scanning initiative acted as a constraint, as did the costs associated therewith for the SMEs. Flexibility and adaptability to deal with contingencies was a particular point frequently stressed by the managers from SMEs. Resiliency awareness was therefore in this sense framed in terms of an ability to be able to be flexible and adaptive enough to respond to situations, "Resiliency is thinking on your feet" as one manager phrased it. Another suggested that it was "dealing with things as best one can, as one becomes aware of the incident or situation that arises". It is an approach that implies a far greater delegation of authority to people and the trust that they will act responsibly in exercising that authority.

In discussions with one of the managers interviewed in the course of this research study it was suggested that "*disaster thinking*" was not all that a prevalent approach in an SME context, as such disasters in the true sense of the word would constitute a far less likely occurrence. Far more likely to occur would be situations that managers had some form of control over or were able to deal with. Disasters such an abnormal climatic conditions and even the current economic meltdown for that matter would according to the manager concerned be outside the ability of a SME manager to influence in any significant way. If such conditions arose that impacted on the institution one would need to conduct a situational assessment and select the most appropriate and logical response option for dealing with the consequences concerned. Issues such as the ESKOM "load shedding" that had a direct impact on the institution's ability to survive were typical such disaster situations from an SME perspective, but most probably not if seen within a much larger global context. There was a tendency for discussions to centre on themes in considering resiliency issues, the more pertinent themes being operational logistics, infrastructure considerations, financial and economic implications, and technology considerations in dealing with unforeseen and unexpected situations that arise. It needs to be reiterated that the intention in conducting the discussions was one of determining views and trends, and not collecting specific or quantitative information that may be analysed in greater detail. The small number of people interviewed would in itself invalidate a more statistical analytical approach.

The picture that emerged from the open ended discussions was essentially one of adaptability; flexibility and an ability to so call "bounce back" from unforeseen and unexpected events that have a significant impact on the institution and its operations. In this sense it implied a reactive stance of consequence management. Questioned as to what constituted flexibility and adaptability the accent tended to be on activities and a sense of in some instances not being quite sure of what it really entailed. The impression gained was one of a willingness to do what it takes to address the situation. According to most of the people interviewed it is a stance where leadership definitely plays a very fundamental role, in that management and staff need to think and react seamlessly in responding to the situation that arises. Managers within public sector institutions, however, emphasised the political aspect of such situations and the bureaucracy that exists in needing to deal with any such situation, which acted as a constraint in most instances in responding rapidly to limit the consequences associated with very significant service disruptions. Within the public sector the degree of flexibility to rapidly respond to the negative consequences of unforeseen events seemed to be constrained. Flexibility was therefore to an extent seen as being determined by the degree of empowerment that existed to take independent decisions.

A NEED FOR RESILIENCY AWARENESS: INSIGHTS GAINED FROM A LITERATURE STUDY

Peter Drucker (1994:9), similarly to the managers interviewed, suggests that *"In turbulent times an enterprise has to be managed both to withstand sudden blows and to avail itself of sudden unexpected opportunities",* The recent subprime mortgage crisis and the ensuing trends and events stemming from the crisis, first sent ripples through the global economy which over a relatively short period of time have gained in intensity and become a tsunami of change. Seen within this context Drucker's (1994:9) introductory statement certainly has relevance. The crisis exposed weaknesses in financial and regulatory frameworks and exposed the risks associated therewith. As governments and international financial agencies grapple with the consequences and attempt to address instability in global financial markets, so business institutions need to determine how they can ride out the storms of change with a minimum disruption to their core business activities. This by implication implies a need for engendering a sense of institutional resiliency to enable the institution to withstand the sudden and often unexpected blows referred to by Drucker (1994:9).

Denhardt and Denhardt (2009) claim that "*natural disasters, terror attacks and fiscal crisis have increased curiosity about how some organizations get stretched to the breaking point but bounce back and recover*". The researchers interpret resiliency in this sense as constituting "*the capacity to recognize and manage challenges in a manner that leaves the organization more flexible and better able to adapt to future challenges*" (Denhardt and Denhardt, 2009). Van Opstal (2007:6) similarly claims that the ability to bounce back from disruption will in future become more prevalent and will constitute a competitive differentiator for companies and countries alike in the 21st century. Weick and Sutcliffe (2001:2), in researching how institutions deal with unexpected trends and events found that managers are not all that skilled therein and events tend to spiral, get worse and disrupt the operations of the institution. Resilience therefore, according to Weick and Sutcliffe (2001:2), implies an ability to bounce back from the inevitable errors, which are part and parcel of an indeterminate world, constitutes a critical facet in managing a modern-day enterprise.

Both from the interviews conducted with managers and the literature resources cited above the notion of a so called ability to "bounce back" or recover from unforeseen events having a significant impact on the institution appears to be a quite pervasive interpretation of resiliency. It is, however, claimed by McManus, Seville, Brunsdon and Vargo (2007) that there is little consensus regarding how this resilience may in fact be achieved in practice. Oldfield (2008:1) questions whether the contemporary accent placed on residency is not merely an attempt to "re-brand" business continuity or to so call "give it a new coat of paint". As may be seen from the preceding reflection on the discussions conducted with managers, this certainly deserves consideration. In a very limited sense it may be the case but it certainly would not appear to be a very wide spread and general interpretation of resiliency as an ability to "bounce back". Notably Oldfield (2008:1) in tracing the Latin origins of the word resilience claims it is derived from the Latin words "resiliens" and "resilire" meaning to "rebound". Oldfield (2008:1) further cites Holding as introducing two definitions of resilience, the first concentrates on stability near an equilibrium steady state, where resilience to disturbance and the speed of return to equilibrium are used as a measure of resilience. This in effect resonates with the notion of rebounding, which is essentially in line with the views expressed by the South African managers interviewed in terms of this study. The second definition focuses on conditions without an equilibrium steady-state, namely where instabilities can transform the system into an alternative state and consequently resiliency is a measure of the magnitude of disturbance that can be absorbed before the system is transformed (Oldfield, 2008:1). In effect attempts at bring about an equilibrium directed at engendering a return to the original state may not only not be an option; it may also be undesirable. The second definition in a sense resonates with a Darwinian perspective of evolutional change. In appearance the economic meltdown is a reflection of the latter definition, while the former resembles a business continuity situation such as having to recover after a computer failure. In reality examples could probably be found to

support both perspectives and depending on context and situation both could probably be simultaneously true.

Resiliency defined as an ability to return to a former state of stability implies a need for some form of plan and action, which places an accent on managing the recovery process. In contrast resiliency defined as an ability to absorb the disturbance that leads to the emergence of the new state implies the notion of adaptation and not necessary bringing about stability. The difference in defining what constitutes resiliency is therefore very subtle in nature. Adaptation in this sense would entail facilitating and supporting the emergence of the new favourably patterns or trends while disrupting those that are deemed to have a negative impact on the institution and its activities. It is an approach that accepts that there may well be new opportunities to be found in the emergent conditions confronting the enterprise. Resiliency would therefore imply an ability to innovatively adapt to the changing conditions.

Innovation would not normally resonate with resiliency as it embodies a dimension of uncertainty and risk, yet it could well be the very ingredient that could ensure the future survival of the institution in a highly competitive services economy. Questioned as to the need for innovation in dealing with unforeseen occurrences most of the managers interview replied in a confirmation mode or as one suggested "*if that is what it takes to address the problem then innovative solutions need to be applied*". Probed as to what innovation implied, solicited a very mixed reaction, with diverse interpretations of the concept. The common thread, however seemed to be the need for finding new, different and inventive solutions that were not part of the usual repertoire of solutions previously adopted. The need for brainstorming and soliciting a wider set of solutions featured as a connotation associated with innovation. The general tend of the discussions resulted in the emergence of a view of applying such solutions to regain the previous state of stability and not necessary a totally new state. Adaptation in this context therefore did not necessary imply bringing about a totally new dispensation in a Darwinian sense of evolutionary change. Implied was more of a view of innovative changes directed at engendering institutional stability in a sea of external environmental turbulence, with an accent on attempting to ensure institutional recovery. It is clear therefore that innovative "bounce back" in a general sense implied a return to the stability associated with the previous order.

A note of caution needs to be sounded in interpreting the insights gained from the very restricted and relatively random sample of managers interviewed as constituting the reality that exists within most South African institutions. A far more in extensive and more representative sample would be required before drawing such a conclusion. It does, however, appear to reflect a trend that needs to be verified.

Coutu (2002:48) claims that her research indicates that most resiliency theories overlap in three respects; the people involved reflect a deep acceptance of reality buttressed by strongly held values that life is meaningful and an uncanny ability improvise. Coutu (2002:48) argues that these three characteristics hold true for resilient institutions as well. The latter uncanny ability improvise resonates with the "innovation" view as expressed by many of the managers with whom the issue of institutional resiliency was discussed. Coutu (2002:48) goes on to warn that a distorted view of reality actually spells disaster. The problem with this is that what actually reflects true reality may be difficult to determine as alternative views may exists in relation thereto. More often than not the reality assessment in subjective and not objective as extensive research may be required to determine the true reality and this could take time that the institution just does not have. In very chaotic conditions some sort of order needs to be established and here the previously cited example of the success Rudy Giuliani achieved in demonstrating and instituting decisive action in the aftermath of the 9/11 chaos that existed serves as a case in point. Reality in this sense would probably imply an acceptance of the situation as opposed to a denial of the perceived realities of the situation confronting the institution. In introducing values that engender a sense of meaning within the institution as an aspect of consideration in defining institutional resiliency Coutu (2002:52) in fact comes to a very pertinent conclusion, namely the role of institutional culture in engendering a sense of

resiliency. Notably, a number of researchers highlight the role that the culture of the institution plays in instilling a sense of resiliency within the institution. It may, however also result in the converse, namely a lack of resiliency. The Challenger and Columbia shuttle disasters clearly bring home the truth of the reality in this regard.

The challenger space shuttle disaster had its origin in a faulty design of an O-ring joint on shuttle's solid rocket booster. According to the report of the presidential commission (1986:120), both NASA and the contractor's management team first failed to recognise it as a problem, then failed to rectify it and finally treated it as an acceptable flight risk. The faulty O-rings may have resulted in the disaster, but the role played by the culture that existed at the time cannot be ignored, as it would appear to have discouraged "whistle blowing" and stopping the launch of the space shuttle. After the tragic and very dramatic consequences associated with of the challenger disaster, one would expect that a culture of resiliency and situational awareness to have emerged at NASA, particularly after the subsequent findings relating thereto had been made known. On 1 February 2003, however, history was to repeat itself with the destruction of the space shuttle Columbia on re-entry into the Earth's atmosphere with all crewmembers aboard the shuttle losing their lives. There is little doubt as to the technical reason for the disaster, Berger (2003) quoting Scott Hubbard summarises it in four simple words, "the foam did it". The report that emanated from the investigation into the disaster, however, makes the following rather revealing and dramatic statement (CAIB report 2003:97): "*In our view, the NASA organizational culture had as much to do with this accident as the foam*". This statement in itself would seem to suggest that a culture of resiliency and situational awareness had not manifested itself in the post-challenger era. It also reflects the importance attributed to culture as a factor of consideration in dealing with institutional resilience.

The Rogers's Commission in fact found that "*NASA had missed warning signs of the impending accident. When the joint began behaving in unexpected ways, neither NASA nor the Solid Rocket Motor manufacturer adequately tested the joint to determine the source of the deviations from specifications or developed a solution to them, even though the problems frequently recurred. Nor did they respond to internal warnings about the faulty seal.*" (CAIB Report: 2003:100). This clearly would seem to suggest that a culture of resilience and situational awareness had not been prevalent prior to the challenger disaster. The *Challenger* accident had profound effects on the U.S. space program and after the Rogers Commission report was issued, NASA implemented most of the changes that the Commission had recommended (CAIB Report: 2003:101). These changes were, however, more of a technical and administrative nature and the culture of the institution was not really transformed to reflect a greater sense of resiliency. This is substantiated by the findings of the Columbia accident investigation board in confirming that the agency's culture had largely remained intact, as did many of its institutional practices in some or other modified form) and the consequences are all so obvious to retrospectively observe with hindsight (CAIB Report, 2003:101.

THE CHALLENGES ASSOCIATED WITH NURTURING A CULTURE OF INSTITUTIONAL RESILIENCY

"Culture is the connective tissue knitting together an organization's people so that they can succeed in the face of environmental challenges and opportunities."

Quick (1992:45)

"Culture is a complex process. This process does not go in good harmony with the traditional ways – based on the Cartesian epistemology"

Browaeys & Baets (2003:332)

Organisational culture from a complexity theory perspective is emergent in nature, it emerges from the interaction that takes place between people and the discussions that take place during such interaction. In essence culture is imbedded within the discourse that takes place on a constant basis within an institution. In this sense the contention by Quick (1992:47)) that "*over time, cultural values and beliefs become embedded in the formal and informal fabric of the organization*", assumes relevance, as the discourse itself is instrumental in weaving the fabric. Institutional culture formation in effect may be construed as constituting a for ever evolving process of learning, as to what works and what is no more effective in dealing with situations and issues. This implies that culture is not something that remains static but is dynamic and evolutionary in nature. This statement may at first be seen as contradicting many a traditional view of organisational culture, the contention being that culture inherently tends to a reflect a state of stability and not constant change. If the feedback mechanism is one of negative feedback this may well be the case, but in cases of positive feedback systems, where traditional ways of thinking are found to be dysfunctional, culture change could well be initiated. In a more post-modern sense the concept "culture" may therefore not be as static and stable as traditionally suggested. It is suggested that the changes emanating from the discourse and interaction that takes place, tends to be evolutionary and in most instances not revolutionary in nature. The result is that frequently the changes taking place are so subtle that they at first may go unnoticed, but over a period they could be quite dramatic.

As noted from the introductory quotation by Quick (1992:45) culture may be interpreted as constituting the human fabric that enables institutions to succeed in the face of contextual challenges. In this connotation institutional culture assumes an element of imparting a sense of resiliency to the institution. A complex adaptive systems approach to culture transformation will therefore undoubtedly have significant implications from a resilience management perspective, in that it will be near impossible to predetermine the outcome of any interventions to stimulate culture change directed at enhancing institutional resiliency. The introductory statement by Browaeys & Baets (2003:332) attests to the notion of culture being a complex process. The problem being that it is impossible to predetermine the specific outcome of a large number of interacting influences that shape the values, beliefs, norms and traditions that evolve over time within an institution. Bennet and Bennet's (2004:99) assertion would seem to support this contention, they contend that "*since culture is a characteristic that emerges from the members of the organizations and their interaction, it is unlikely that one could ever trace all the influences and specific forces within a group of people that would create a given culture*". It is this phenomenon that has tended to engender the perception that so called managing culture change is difficult. While it may not be all that easy in nature, it is possible to attempt to initiate a change in the culture of the institution, by launching appropriate interventions, but as previously noted in Bennet and Bennet's (2004:99) assertion, the precise outcome of such initiatives are very uncertain, as they are emergent in nature.

The concept "organisational culture" derives the importance attributed to it as a concept from the fact that it acts as a perceptual and behavioural determinant. It influences how people see and interpret their life-world of day-to-day experiences. In this sense it acts as a so called cultural filter through which people view their world of life experiences and provide meaning thereto in the interpretation of these experiences. Decision-making in organisations is very frequently referred to as being rational and logical, yet it would appear that such an assumption needs to be questioned if cultural determinants can give rise to an interpreted reality as opposed to an objective reality. A typical case in point is the issue of suicide bombers. Within a western cultural sense their behaviour would hardly be construed to be rational, while within the cultural milieu within which they exist it is considered to be quite rational behaviour. Seen within the context of the different cultural contexts that exist, the same event or situation assumes a totally different meaning and interpretation. The same applies within an institutional context, where culture may well result in different interpretations of what could be deemed to be a common world-view. It also suggests that institutions would not only interpret contextual situations differently but react differently thereto. The economic meltdown it would seem has for instance engendered a lot of different perspectives of how best to deal with the situation. It

could be argued that the values, beliefs, norms and expectations that underpinning the culture of the institutions has a very distinct role to play in diversity of interpretation and consequently reaction thereto.

In the preceding discussion it was noted that Coutu (2002:48) specifically mentions three characteristics of resilient institutions and one in particular has very specific relevance in terms of this discussion, namely "*strong values infusing an environment with meaning because they offer ways to interpret and shape events*". Implied is the notion of culture engendering a shared sense of institutional reality, in the interpretation and shaping of events. As noted by Coutu (2002:48) "*in extremely adverse situations, rose-colored thinking can actually spell disaster*" and, as also seen in the preceding discussion, the Columbia space shuttle disaster serves as a tragic conformation of this reality. A culture of resilience is therefore one that values diversity of opinion, perspective and views and actively encourages employees to express these views. The underpinning cultural attributes being that respect, trust, and tolerance of diversity, and independence of thinking.

A culture of resilience is not a straight jacket culture of towing the line regardless of perceived trends and situations that are emerging and that suggest that possible adversity could be waiting on the horizon. It stands in contrast to a culture of conformity that is personified in what Bennet and Bennet (2002:101) describe as a power culture, one based on a centralised and dominant decision making cadre of executives and managers. A culture of resilience has as its basis the characteristics identified by Surowiecki (2004:10), namely diversity of opinion, independence of thought and decentralisation, all of which stand in stark contrast to the power culture described by Bennet and Bennet (2002:101). Far more in line with a culture of resiliency at first glance is the person culture discussed by Bennet and Bennet (2002:101), it is described as one of "*little or no overall cohesion*" and as being "*more of a collection of individuals who band together to make it easier for each of them to do their own thing*". It is suggested that this may, however, be stretching the meaning associated with a culture of resilience rather a bit far. Bennet and Bennet (2002:101) concur that it is "*more chaotic than complex adaptive*".

Bell (2002:2) claims that "*a resilient culture is built on principles of organizational empowerment, purpose, trust and accountability*", Bell (2002:2) further claims that "*the resilient organizational culture has a strong sense of enterprise purpose that cascades down and across as to the enterprise*". It is this sense of shared purpose that provides overall resiliency cohesion that contradicts the person culture previously alluded to. It is a sense of shared purpose that goes hand in hand with the empowerment of individuals that instils a sense of resiliency in the institution. Implied therefore is the notion of a shared purpose constraining the extent of the individualism that exists and the purpose in this case is one of engendering resiliency so as to be able to survive the unexpected tsunamis that have a habit of emerging when least expected. Bell (2002:1) alleges that "*a resilient organization is a passionate organization, and it is this culture of passion that drives, achieves and rewards personal and team accountability*". The picture that therefore emerges in portraying a culture of resiliency is one where employees are empowered with a sense of individualism that is bounded by a passionate commitment to a shared vision of what the institution hopes to accomplish.

With the preceding discussion in mind, it is suggested that nurturing a culture of resiliency has as its basis the following assumptions:

- Diversity and innovation are hallmarks of the institution's values and beliefs.
- A sense of flexibility and a willingness to adapt to changing conditions.
- The accent is on learning from failure and adversity and not one of attempting to determine who is to blame, so as to take disciplinary action. It is in fact deemed imperative that fear and trepidation be driven out of the institution.
- It is a culture of caring and support that enables employees to deal with the stress associated with the challenges encountered and the adaptation that need to take place in dealing therewith.

- The employees of the organisation should feel safe and not compelled to follow the "herd", it is a sense of independence that is constrained by a common sense of purpose and pride within the institution.
- The need is for engendering employee awareness and sensitivity in order to detect and draw attention to emergent patterns or trends that could have an impact on the environment in which the institution functions or on the activities of the organisation itself.
- Mutual respect and a sense of trusts and collaboration characterise the interaction and discourse that takes place within the institution and with its suppliers, clients and stakeholder communities.

The list is hardly comprehensive and merely serves to indicate typical assumptions underpinning a culture of resiliency. Nurturing cultural attributes such as values, beliefs and norms that resonate with a culture of resiliency implies that they need to be lived out in the interaction and discussions that take place on a day-to-day basis within the institution. Formulating a list of desired cultural attributes and incorporating them within mission and value statements are of little value in nurturing a culture of resiliency. People believe what they see and experience, not what they are told. Culture as a complex adaptive system will emerge from the behavioural expressions that inculcate a specific mindset and paradigm of management within the institution. There is no magic recipe or set of processes that if followed will result in making an institution resilient. This stands in contrast to traditional scientific management theory that assumes clear cut cause effect relationships, enabling a step by step approach to manage culture change.

The purpose in this paper has been to draw attention to the need for a culture of residency and determine what this means in practice. It has certainly not been to provide a recipe for institutional resiliency. It is argued that cultural resiliency stems from a mindset that gives rise to behavioural attributes that engender institutional resiliency. Underpinning this mindset are the cultural attributes that resonate with a sense of resiliency. Clearly, reflected in the discussion is the notion of bounded instability that enables innovation to surface in dealing with the challenges confronting the institution on a daily basis.

In summary, it is argued that cultural resiliency stems from the host of daily experiences in responding to the stresses and disjunctures that position and equips the institution and its employees to adapt and deal with the unforeseen and unexpected, which increasingly characterises the reality of the modern-day institutional life-world. And in conclusion, it is suggested that a complex adaptive systems approach may be more effective in nurturing a culture of resiliency in institutions than many of the traditional approaches frequently encountered within the literature. It assumes a sense of humility in that people are bound to make slip-up along the way, but the vital aspect will be that of learning from the experience that will take place along the way. A resilient organization is a passionate organization, and it is this culture of passion that drives, achieves and rewards personal and team accountability.

CONCLUSION

From the preceding discourse is will have become clear that a culture of resiliency essentially stems from the interactive discussions and dialog that takes place within institutions on a day-to-day basis. Within a context characterised by unexpected, unforeseen and discontinuous change that can significantly impact on institutions and their operations, the need for resiliency could never be greater. With this in mind the key significance of this paper is the realisation that executives and managers need to ensure that the underpinning values, beliefs, norms and expectations that give rise to a culture of resiliency are woven into the very fabric of their institution's day-to-day interactions and dialog that takes place. Living out these cultural attributes in the workplace, on a daily basis, therefore assumes unprecedented importance within a globally integrated economy. As seen from the discussion the cultural attributes

associated with resiliency encourages a diversity of opinion, perspectives and views and actively encourages staff to express these views and draw attention to emerging trends that could seriously disrupt the operations of the institution.

REFERENCES

Bell MA. 2002. The five principles of organisational resilience. Gartner Research. [Online] Available from: http://www.gartner.com/resources/103600/103658/103658.pdf. Retrieved 14/12/2008

Bennet A. & Bennet D. 2004. Organizational survival in the new world: The intelligent complex adaptive system. Amsterdam: KMCI.

Berger, B. 2003. Columbia report faults NASA culture, government oversight. [Online] Available from: http://www.space.com/missionlaunches/caib_report_030826.html Retrieved 7/1/2009

Browaeys M.J. & Baets W. 2003. Cultural complexity: a new epistemological perspective. The Learning Organization, 10(6):332-339.

CAIB Report. 2003. Report of Columbia Accident Investigation Board, Volume I," [Online} Available from: http://caib.nasa.gov/news/report/pdf/vol1/chapters/chapter5.pdf Retrieved 22/1/2009.

Cohen T. 2009. Rio Tinto Alcan permanently shutting Quebec smelter, reducing refinery output. [Online] Available Url: http://ca.news.finance.yahoo.com/s/20012009/2/biz-finance-rio-tinto-alcan-permanently-shutting-quebec-smelter-reducing.html Retrieved 6/4/2009

Denhardt J. & Denhardt R. 2009. Navigating the fiscal crisis: Testing strategies for local leaders. [Online] Available from: http://www.transformgov.org/files/whitepaper/3b_Organizational_Resilience_and_Crises_Confr onting_Cities_Janet_Robert_Denhardt.pdf Retrieved 14/2/2009

Drucker PF. 1994. Managing in turbulent times. Oxford: Butterworth-Henemann

Gaddum R. 2004. Business resilience – the next step forward for business continuity. [Online] Available Url: http://www.continuitycentral.com/feature083.htm Retrieved 7/6/2009.

Financial Stability Forum. 2008. Report of the Financial Stability Forum on enhancing market and institutional resilience. [Online] Available from: http://www.fsforum.org/publications/r_0804.pdf?noframes=1 Retrieved 14/2/2009

Friedman TL. 2006. The world is flat: The globalized world in the twenty-first century. London: Penguin.

Juarrero A. 2009. Members' profiles. American Philosophical Practitioners Association. [Online] Available from: http://www.appa.edu/projuar.htm Retrieved 14/2/2009

Kirby A. 2000. Analysis: The Chernobyl legacy. BBC News, 5 June, 17:41 GMT. [Online] Available from: http://news.bbc.co.uk/1/hi/world/europe/778607.stm Retrieved 14/2/2009

McManus S., Seville E., Brunsdon D. and Vargo J. 2007. Resilience management: A framework for assessing and improving the resilience of organisations. [Online] Available from: www.resorgs.org.nz/pubs/Resilience%20Management%20Research%20Report%20ResOrgs% 2007-01.pdf Retrieved 14/12/2008

Merali Y. 2008. Complexity and the services science agenda. In Hefley B. & Murphy W. eds. Service science, management and engineering: Education for the 21st century. London: Springer, p285-293.

Oldfield R. 2008. Organizational resilience. [Online] Available from: http://www.continuitycentral.com/feature0618.html Retrieved 19/3/2009

Quick JC. 1992. Crafting an Organizational Culture: Herb's Hand at Southwest Airlines. Organizational Dynamics, 21(2):45-56, Autumn.

Presidential Commission (Rogers Report). 1986. Report of the Presidential Commission on the Space Shuttle Challenger accident: chapter 6 - an accident rooted in history. [Online] Available from: http://science.ksc.nasa.gov/shuttle/missions/51-l/docs/rogers-commission/Chapter-6.txt Retrieved 14/12/2008

Snowden DJ. & Boone ME. 2007. A leader's framework for decision making. Harvard Business Review, 85(11):69-76, November.

Starr R., Newfrock J. & Delurey M. Undated. Enterprise resilience: managing risk in the networked economy. Stratey+business," [Online] Available from: http//www.strategy-business.com/press/16635507/8375?tid=230&pg=all Retrieved 19/1/2009.

Stewart TA. 2002. How to think with your gut: How the geniuses behind the Osbournes, the Mini, Federal Express, and Starbucks followed their instincts and reached success. [Online] Available from: http://prod.business2.com/articles/mag/print/0,1643,44584,00.html Retrieved 19/11/2006.

Van Opstal D. 2007. The resilient Economy: Integrating competitiveness and security. Council on competitiveness. [Online] Available from: http://www.compete-resilience.org/upload/Transform_The_Resilient_Economy_FINAL_pdf.pdf Retrieved 19/8/2008.

Watanagase T. 2008. Tarisa Watanagase: Global financial crisis and economic integration in Asia. Address by Dr Tarisa Watanagase, Governor, Bank of Thailand, at the TU-JBIC International Conference on "The Future of Economic Integration in Asia", Bangkok, 21 November 2008. [Online] Available from: http://www.bis.org/review/r081128c.pdf Retrieved 20/2/2009.

Weeks R. & Benade S. 2008. Managing a South African organisation within a dual manufacturing and services economy. Acta Commercii, 8:208-218.

Weick KE & Sutcliffe KM. 2001. Managing the unexpected: Assuring high performance in an age of complexity. San Francisco: Jossey-Bass.