Chapter 11
Learning and Innovation in Uncertain Times: The Role of Organisational Systems and Managerial Perceptions of Uncertainty

Canan Katrin Akpolat
University of Technology, Australia

Fawzy Soliman
UTS Business School, University of Technology, Sydney, Australia

Jochen Schweitzer
University of Technology, Australia

ABSTRACT
To ensure sustainable growth and survival, organisations rely on learning and innovation as vital processes and abilities. However, with increasingly unpredictable and dynamically changing business environments, it is imperative to better access and manage perceptions of uncertain environments in the context of an organisational system. In this chapter, the authors take a view at the intricacies and implications of relevant literatures and point out the yet under-researched role of perceived environmental uncertainty for learning and innovation.

INTRODUCTION
For many businesses around the world innovation has inevitably become the most important source of creating competitive advantage. Even though, over years, managers have improved business performance by becoming lean and optimising processes of producing and servicing, it is evident that reducing wastage and costs alone will not grow a business as does innovation (Tomkovick & Miller, 2000). Yet, the successful development of innovation relies on numerous managerial decisions along the innovation journey, each of which can bear significant risks. To mitigate risks and to make informed decisions for creating new and better products and services managers rely on a range of information sources. Where they
lack relevant information and when they have a limited understanding managers will experience uncertainties, which in return may jeopardise the expected innovative outcome (Song & Montoya-Weiss, 2001; Cao, Zhao & Nagahira, 2010; Soliman, 2010).

A key reason for poor decision-making and subsequent low performance or even failure of innovation is how managers perceive and interpret environmental uncertainties (Capon, Farley, Lehmann & Hulbert, 1992; Song & Montoya-Weiss, 1998). Perceived environmental uncertainty is the inability of a manager to assess and predict any changes in regards to factors that are external to his/her organisation’s environment such as customers, suppliers and governments (Milliken, 1987; Dickson & Weaver, 1997). In this chapter we take a view at the intricacies of organizational learning and innovation in the face of perceived environmental uncertainty. As business environments become progressively turbulent organisations and their managers are under pressure to adapt to changes not only more frequently but also a lot quicker. Adapting to changes that are related to an organisation’s environment require that managers understand and learn how the environment is operating. Thus, the organisational ability to learn, create and use knowledge has become an important source for innovation. In what follows we review the literature on open systems, organisations and perceived environmental uncertainty to untangle some important implications for learning, knowledge transfer and subsequent innovation in organisations.

**Organisations as Open and Social Systems**

System theory provides a first perspective for critical and normative exploration (Vancouver, 1996). The theory has been useful to explain phenomena in many disciplines including management, sociology, biology, mathematics, physics, psychology, ecology, economics, and law (von Bertalanffy, 1950; Boulding, 1956; Laszlo & Krippner, 1998; Drack, Apfalter & Pouvreau, 2007; Mingers & White, 2010). The central believe in systems thinking is to view a phenomenon holistically ‘as a set of diverse interacting elements within an environment’ (Mingers & White, 2010, p. 1148), and to acknowledge that the relationship between the components is more meaningful than investigating each component in isolation (von Bertalanffy, 1972).

Boulding (1956) suggests a ‘hierarchy of systems’ for systematic analytical purposes, whereby the ‘hierarchy of systems’ is categorised in terms of complexity ranging from frameworks (level 1) to transcendental systems (level 9). Furthermore, characteristics of lower level systems are present in the higher level systems but not vice versa. In other words, higher level systems have unique added characteristics in comparison to lower level systems. For instance, animals (level 6) have all the characteristics of systems from level 1 up to level 5, while humans (level 7) have all the characteristics from level 1 to 6 but not all characteristics from social organisations (level 8). Table 1 summarises Boulding’s ‘hierarchy of systems’.

Drawing on this early work, Katz and Kahn (1967) identified characteristics to distinguish open systems from closed systems. Although each open system differs from other open systems there are generic characteristics that apply to all open systems.

1. **The Importation of Energy:** All open systems import energy from their environment. Organisations depend on resources or materials from the environment, they cannot function self-sufficiently.
2. **The Through-Put:** The absorbed energy will be transformed by open systems. Organisation will transform the resources and materials into products or services.
3. **The Output:** Once the transformation of energy into products is completed the system will export it to the environment.