THE HAZELWOOD MINE FIRE 2014 -- EVIDENCE OF 'ORGANISATIONAL PATH DEPENDENCY' IN PUBLIC AND PRIVATE MANAGEMENT

Gwendoline Webber and Richard Webber

ABSTRACT

The state-owned brown coal (lignite) power generation industry in the Latrobe Valley, Australia was commenced in the 1930's. The State Electricity Commission Victoria (SECV) managed this industry until its disaggregation, corporatisation, and privatisation, into four privately owned power stations over the 1980s and 1990s. Engie (72%) (formerly known as GCF Suez S.A.), and Mitsui & Co (28%) privately owned the oldest of these plants, the Hazelwood Power Station and Mine when on 9 February 2014, a large out-of-control brown coal fire commenced in the 'open-cut' mine adjacent to the Hazelwood Power Station.

Although fires are typical in coal sites, this fire became a crisis, burning for 45 days and a cause of considerable stress and dislocation to the local population of 70,000. After the crisis, the Victorian State Government conducted a public inquiry into the disaster, instituted a long-term health study of affected residents, and established the office of Commissioner for Mine Rehabilitation. In 2016, the private owners announced that the plant would close permanently in 2017, due to its advanced age (Engie 2016). This was a huge loss of jobs and a loss of 25% of the state's available power. The subsequent Victorian State Government Hazelwood Mine Fire Inquiry (2014) concluded that, the Hazelwood mine fire was a foreseeable risk that regulatory agencies failed to recognise.

This paper examines the public management of the mine fire crisis using the model of 'organisational path dependency' developed by Sydow, Schreyogg & Koch, (2005, 2009) adapted to this situation of 'inter-organisational path dependency'. The closure of a lignite power station is significant from an environmental perspective, however, discussion of the environmental impact of the closure is beyond the scope of this paper. Although the power station and mine were in private ownership, the response to the incident was largely in the control of public authorities.

This paper refers to Mine-Fire Inquiry transcripts and other publications in order to examine the utility of path dependency theory in explaining events before and after the mine fire crisis. It identifies a watershed and subsequent self-reinforcing factors that led to

Corresponding Author: w.webber@deakin.edu

mismanagement of the fire. Moreover, this catastrophe became the 'path breaking event' that changed public management in this sector and from which new paths may emerge.

Keywords *- Privatisation; Power generation; Path dependency; Lock-in; Hazelwood Fire, Electricity*

INTRODUCTION

This paper applies organisational path dependence theory to analyse the response of public sector agencies and a public infrastructure operator to a short-term environmental crisis. The major data source for this analysis is the Hazelwood Mine Fire Inquiry Report (2014), which is a judicial inquiry established by the Victorian State Government in the aftermath of the crisis. This path dependence analysis applies the model of 'organisational path dependence' proposed by Sydow, Schreyogg & Koch (2005, 2009) to this inter-organisational situation.

According to Sydow et al. (2005, 2009), path dependence is a process often initiated by a single event, which over time establishes a path that is self-reinforcing due to the effects of coordination, complementary, learning, and, adaptive expectation factors. These effects cause the path to become irreversible, 'locked-in' to inefficiencies, so that managers believe they lack the power to act outside the path. This eventually leads to the death of the organisation (Sydow, Schreyogg & Koch, 2009).

In this paper we investigate whether the inadequacy of the response to the crisis of those in both private and public management positions is due to locked-in path dependant behaviours in the respective responsible organisations.

This paper is structured as follows. First, we discuss the background events of the mine-fire crisis. Second were examine the unfolding of the crisis and the immediate impact. Third, we consider path dependency in the context of the field of crisis management generally. The definition of Drayton (2000) is used to define a 'crisis': a threat to core values, urgency, and a high degree of uncertainty. We find that although the existence of path dependency as a factor contributing to poor responses to crises by responsible authorities, the concept is rarely examined in any detail. Fourth, we therefore utilise the work of Sydow, Schreyogg & Koch, (2005, 2009) to unpack the elements of path dependency and apply them to the current mine fire crisis. In particular we examine the crisis using the four reinforcing effects identified by Sydow et al. (2005, 2009). Finally, our conclusion is presented.

METHOD AND DATA ANALYSIS

To understand and to be able to explain current and future organisational paths, researchers need to identify causal explanations from past paths (Breznitz, 2010; Schreyögg & Sydow, 2010; Sydow et al., 2009). This requires retrospective studies that re-present the past. According to Wolfram Cox and Hassard (2007) re-presenting the past can be achieved by identifying an accurate past through the collection of accurate data, interpreting the past using hindsight, co-opting the past to look for causal explanations to explain the present. The evidence sought to examine path dependence in the Mine Fire Crisis employs these three retrospective methods. The fourth strategy identified by Wolfram Cox and Hassard (2007) of re-presenting the past using fragmented narrative methodologies is not used in this study.

The data for this study are derived mainly from the Hazelwood Mine Fire Board of Inquiry (2014) commissioned by the State Government of Victoria. The model of organisational path dependence (Sydow et al. 2009) is the framework used to interpret this data.

Background events of the crisis

The Hazelwood Power Station and adjacent brown coal mine is located in the Latrobe Valley, 150 kilometres east of the city of Melbourne, the state capital of Australia's second most populous state, Victoria (Australian Bureau of Statistics, 2016).

Mining of brown coal in the Latrobe Valley commenced as early as 1888. Ownership of the Hazelwood mine site by the State Electricity Commission of Victoria took place on 1 April 1924 (Mine Fire Inquiry, 2014, part 1, p.52).

The commissioning of the Hazelwood Power Station took place in the 1960's. Prior to closure in March 2017, it provided up to 25% of Victoria's baseload electricity, which is 5.4% of Australia's baseload electricity. Hazelwood Power Station was also one of the world's highest emitters of carbon dioxide and was responsible for almost 15 percent of Victoria's annual greenhouse gas emissions and 3 percent of Australia's greenhouse gas emissions. (Environment Victoria, 2019).

The 'open-cut' brown coal mine adjacent to the Hazelwood Power Station has an area of 1,165 hectares, the perimeter of the open cut mine being approximately 18 kilometres in length. The mine has 7 levels of steep terraces allowing access to the mine floor. The floor of the mine is approximately 100 metres below ground level (Mine Fire Inquiry, 2014, part 2, p. 67).

The Hazelwood Power Station and Mine operated as a public state owned enterprise from 1960s until its privatisation in the 1990s. At the time of the mine fire in 2014, GDF Suez

S.A., (now trading as Engie) a French global energy conglomerate, owned 72% of the mine and managed all operations with Mitsui & Co. Ltd, a Japanese company, holding the remaining 28% of equity.

The privatisation of the electricity resources of the state of Victoria during the 1990s was the source of considerable controversy at the time. In the context of the 2014 mine-fire, the better preparedness of the publicly managed authority compared to the private operator raises the argument that in a public management setting managers may be better able to make fire safety decisions as they are not so deeply obliged to provide financial benefits to shareholders.(Doig, 2015). While worthy of further exploration, this aspect is beyond the scope of this paper. A corollary of this argument is that returning ownership of the electricity generation sector into public hands would switch the focus of management away from concentration on profit to broader social responsibility goals. While this view has gained some support in other countries (for example, Germany) it does not appear to be under consideration in the state of Victoria. (Weber, Cabras & Frahm 2019)

The Australian State of Victoria is one of the most bushfire prone areas in the world. In late summer (January/February 2014), 16 days of above 30 degrees Celsius and hot winds resulted in widespread bushfires. On 9 February 2014, a major coal fire began in the disused worked-out area of the Hazelwood open-cut coal mine. The fire began by 'ember attack' from nearby bushfires, carried by winds ahead of the fire front (Mine Fire Inquiry, 2014).

> Eucalypt species shed their bark annually, resulting in the accumulation of bark ribbons, providing an ignition source in a high intensity fire. These bark ribbons can stay alight in excess of 30 minutes. They can travel up to five kilometres in strong winds, and 20–30 kilometres if caught up in convection columns (Mine Fire Inquiry, 2014, part 2, p.60)

By 11 February 2014, the fire covered over 50% of the surface area of the mine. The fire burned for 45 days and covered much of the surrounding area and population in acrid smoke. The smoke consisted of pollutants including dangerous levels of carbon monoxide and other airborne 'particulate matter' (Mine Fire Inquiry, 2014, part 4, p.241).

The crisis constituted two emergencies; it was both a major complex fire emergency and a serious public health emergency (Mine Fire Inquiry, 2014, Executive Summary, p. 12)

According to Doig's damaging assessment:

> The town of Morwell, home to 14,000 people, is less than half a kilometre from Hazelwood mine. In the Latrobe Valley over 100,000 people live within 20 kilometres of the mine. Choking smoke and toxic gases filled the Valley. Carcinogenic brown coal ash fell as far away as Warragul, 50 kilometres to the west,

> and Sale, 60 kilometres to the east… The fire was foreseeable…The disaster was preventable (Doig, Prologue, 2015).

The 'foreseeability' of the crisis is something that the subsequent government enquiry stressed. High summer temperatures, the ability of bushfires to travel long distances through the process of ember attack, and the ability of lignite to ignite in such circumstances were all factors which should have alerted the operators and regulators to the danger of a widespread mine fire. The lack of prevention measures and crisis response readiness by the operators and government regulators was heavily criticised by the subsequent Mine Fire Inquiry. (Mine Fire Inquiry, 2014).

In addition to short-term health effects, concern over long-term health implications prompted the Victorian government to establish in 2016 the Hazelwood Health Study, which is about:

> identifying potential health outcomes for people who may have been impacted by the smoke from the mine fire. These might include heart and lung disease, cancer or mental health problems. It will also look at the effects on vulnerable groups such as infants and children, young people, and older people (Hazelwood Health Study, 2019).

In October 2016, the Victorian Treasurer, Tim Pallas, met with representatives of GDF Suez in Paris to take part in discussions on the future of the Hazelwood operation (Australian Broadcasting News, 2016a). In November 2016, GDF Suez announced the plant would cease operations in March 2017. GDF Suez planned to remain on site for two years to oversee decommissioning and demolition by September 2019. In the announcement, there was no mention of the mine fire being a reason for closure of the plant and the mine (Engie, 2016).

In May 2017, the Victorian state government established the office of Latrobe Valley Regional Mine Commissioner to develop plans for the rehabilitation of worked out mine sites in the Latrobe Valley, with the Hazelwood site being the only one at that time (Latrobe Valley Mine Rehabilitation Commissioner, 2017).

In addition to the direct effects of exposure to smoke and pollution, the estimated financial effects on the local community was AU$100 million (Mine Fire Inquiry, 2014). At the individual personal level, there was also distress, confusion and feelings of abandonment by those in power (Doig, 2015).

In November 2016, in the aftermath of the crisis and before the closure announcement, the State Government of Victoria established a Board of Inquiry ('the Inquiry') to inquire into, report on, and make recommendations in relation to the disaster. The terms of reference of the Inquiry were broad and in August 2014, a comprehensive report presented eighteen recommendations to government.

While there was praise for those on the 'front-line' engaged in firefighting and emergency services, the Inquiry found that, in general, there was inadequate readiness and response by the relevant public sector health and environmental agencies and the mine operator. This lack of readiness and response resulted in considerable loss of amenity, productivity and adverse health consequences for many thousands of residents in the local community for a period of forty-five days and beyond (Mine Fire Inquiry, 2014).

The Crisis

According to Drayton (2009), three conditions must exist for a crisis: a threat to core values, urgency, and a high degree of uncertainty. These are not static variables but exist on a continuum (Drayton, 2009, p.2). These conditions were evident in the Latrobe Valley Mine Fire.

First, the events threatened the core values of both the private mine owner and the state government agencies. For the mine operator, their mission statement of 'building better lives by energising people and communities' lost the respect of the Latrobe Valley and Victorian community both during the fire and in the wake of the report of the inquiry (Australian Broadcasting News, 2019b). For the government agencies, in particular state health and environmental agencies, this sustained pollution event was a direct challenge to "visions" of 'enhancing the well-being of all Victorians' (VicHealth, 2019) or being a 'world-class regulator of pollution and waste' (Environment Protection Authority Victoria, 2019).

Second, urgency was evident in the need to solve the problem. Fire crews and equipment from interstate were utilised, as is often the case on major Australian fires. The nature of the fire did not lend itself to a rapid solution and as the crisis continued, disquiet in the community grew.

> 'Protest meetings' - essentially calls for help - were organised locally and in Melbourne, the state capital. While the distress of the local community was made known, in reality there was little that could be done to bring the crisis to a close more quickly, as firefighters methodically extinguished the blaze 'incrementally suppressing fire in 100 metre segments' (Mine Fire Inquiry, 2014, Executive Summary, p. 14)

Third, the event had a high degree of uncertainty. Uncertainty of how to respond was evident in all agencies. Although fires occur regularly in open-cut brown coal mines, a fire on this massive scale was new to the firefighters. It took for example an expert reference group ten days to develop the 100m fire suppression strategy. The health and environment agency sought solutions from previous events. Drayton (2009) advises those responding to a crisis to not 'prepare for the [most recent] crisis as they never happen in exactly the same way twice' (p.10).

Without any doubt, forty-five days of an uncontrolled coal fire, in a populous area, fulfils Drayton's conditions of being a crisis. Drayton (2009) also states that an inadequate response to crises is often due to path dependence.

Crisis management and path dependency

The literature on crisis management acknowledges the role of path dependency in sub-optimal reactions to crises (Drayton 2009). The key purpose of any path dependence analysis is an attempt to understand why organisations are unable to adapt to changing circumstances. In a crisis, the inability to adapt to rapidly changing circumstances and reliance on previous solutions to deal with the current solution may often typically result in a poor response from those charged with management of the situation. In their simplest form, theories of path dependency state that 'when choices must be made the option most likely to be chosen is that which most closely resembles existing practice or previous choices (Kirk, Reeves & Blackstock, 2005).

In reviewing crisis management research, Dayton (2009) notes the relevance of path-dependence in the 'cognitive-institutional' approach to crisis studies. In particular the role of 'sequencing' in creating a perception of path dependency, that is, the tendency for the current course of action to be reinforced by previous decisions or, an unwillingness to change course because of prior investment. Closely allied to this is the extent of bureaucratic conflict or co-operation in the interaction of the organisational entities responding to the crisis.

Studies of path dependence in organisations have tended to focus on institutional rigidification of long term productive or bureaucratic processes; for example, the Auckland Power Blackout 1998 (Fischer & Miller, 2017), Toyota Production Systems (van Driel & Dolfsma, 2009), USA Public Authorities (Kuiper & Boin, 2010) and the French Timber Industry (Marty, 2010). More recently, the role of path dependence has been used to examine the reaction of various European governments to the Global Financial Crisis 2007/2008, (Guy Peters, 2011); (Kiess, Norman, Temple & Uba, 2015), as well as public management of environmental infrastructure including, Australia's Murray-Darling Basin Environmental Water Recovery Program (Marshall & Alexandra, 2015), and Dutch Flood Management (van Buuren, Ellen & Warner, 2016). While numerous studies have investigated the rigidity of organisations causing their inability to act outside of their known behaviour, only a few studies have used any analytical approach to clarify *the process* of path dependence, which led to that rigidity (Schreyögg & Sydow, 2010).

Sydow, Schreyögg & Koch (2005, 2009) developed an analytical framework to 'open the black box' of organisational path dependence. In this model, prior to path-dependence taking hold, managers have a broad scope of decision choices. Following an event, which may be imperceptible at the time, these managerial choices begin to narrow, and at some critical juncture or tipping point, a dominant pattern of positive self-reinforcing processes increasingly restricts the scope of managerial decision choices and the process of path lock-in begins. The model identifies four distinct types of self-reinforcing effects in the

process. These are: coordination effects; complementary effects; learning effects; and, adaptive expectation effects. Eventually, the path locks-in to a situation dominated by irreversible and inefficient managerial decisions, in which managers enmeshed in the dependent path become blind to alternatives, lose their ability to make decision choices, and are unable to change or unlock the dependent the path. The only way a locked-in dependent path can be broken is by an entrepreneurial led change, a shock to the system, or, death of the organisation (Garud & Karnøe, 2003; Garud et al., 2010; Sydow et al., 2009).

Pre-path dependence period

An analysis of the data suggests the pre-path dependent period in relation to the management of Mine Fire Disaster is the period in the 1980s, prior to the disaggregation and corporatisation of the SECV. Prior to this period the SECV employed 8,850 employees in the Latrobe Valley (Benson, 1983; 1991). According to one ex-SECV Engineering Manager, the SECV was 'superbly engineered' and focused on the effectiveness of its technical processes without concern for costs or efficiencies (Webber 2012). As a publicly funded enterprise the SECV never hired commercial operators or engaged in commercial analysis of its operation until the late 1980s (ex SECV HR [and Transport] Manager, in Webber 2012).

> [W]hether you were on the union side or the management side, the SECV had become an organisation with a huge engineering capability, was up with its peers in the world in terms of reliability of supply and very good design and capability of building world class plant but it was a huge sort of monolith that did all of those good things but was hopelessly inefficient as well (ex-SECV HR Manager 1).

The inefficiencies of the SECV were a consequence of state policies of welfarism, bureaucracy, engineering prowess, and an industrial relations system that supported these policies.

> The SECV had a lot of inefficiencies in terms of work practices and numbers of people employed. For example, the SECV used to train a large number of apprentices and the maintenance unions made the SECV retain all the graduating apprentices so the number of employees just continued to grow (ex-SECV HR Manager 4).

Several interviews by Webber (2012) confirm that prior to its corporatisation and subsequent privatisation, SECV management had a broad scope of decision choices unfettered by commercial imperatives but considered 'inefficient' in commercial terms and unsustainable under private ownership (Webber 2012).

Triggering and watershed events

It was as a result of the events of disaggregation and corporatisation of the SECV in the 1980s that commercial imperatives began to dominate all managerial decisions. This pre-privatisation period of disaggregation, outsourcing and contracting dominated SECV managerial decision-making and this led to significant job losses. For example, the SECV

closed its training centre that had employed nearly 500 new apprentices a year (Barton & Fairbrother, 2007) and the Transport Section made a 70% savings through outsourcing its work and eliminating approximately 2,500 SECV jobs (ex-SECV HR 4 [and Transport] Manager, in Webber 2012).

> [H]ow easy it was to outsource something as big as maintenance and I think I was amazed that the outsourcing of the very first point of transport just went almost without a hiccup…it occurred without as much as a whimper really...The SECV was very inefficient. It had like a 'job for life' mentality, it had people who were not particularly productive and weren't really focused on outcomes but on other things (ex-SECV HR Manager 4, in Webber 2012).

Under the path-dependent model, these events of disaggregation and corporatisation in the 1980s *triggered* a dominant pattern of commercial decision-making, which attracted new private owners who would inevitably continue to apply the 'commercial imperative' under their private ownership of these once publicly owned and managed facilities.

The event of privatisation in the 1990s was the *watershed moment* after which the Victorian government and its agencies lost all operational control of Hazelwood Power and Mine. With much of the political and social pain of disaggregation, corporatisation, and privatisation behind them, the government's focus on the industry was no longer as manager, but on the guarantee of supply of power to the Victorian population. This lack of focus on direct management of Hazelwood Power and Mine by the state continued until 2014, when it declared the Hazelwood Mine Fire to be a disaster.

Neither owners nor regulators were prepared or able to react adequately to the mine fire crisis and both were subject to substantial criticism in the subsequent Inquiry, as well as negative community sentiment. The following is an analysis of possible dominant patterns of positive *self-reinforcing effects* that may have led to the *lock-in* of these inefficient managerial decisions and the absence of known superior alternatives. Under the path-dependent model, positive self-reinforcing effects are the coordination, complementary, learning, and adaptive expectation effects.

Coordination effects

According to Sydow et al. (2009) coordinating events that reinforce the path are the organisation's rules and routines initially designed to guide organisational personnel to create or increase organisational efficiencies. Nelson and Winter (1982) describe these as the organisation's genetic blueprints set by historical organisational policies. Although initially designed to create efficiency, coordination effects, exert a strong rigidifying and restraining counter-pressure against new strategies. There are several examples of the effects of the coordination rules and routines inhibiting the effectiveness of government agencies responsible for responding to and managing the problems caused by the mine fire.

Coordination effects were evident in the Health Department of Victoria, which had a policy of only acting on data verified using the Australian National Ambient Air Quality standard. 'This standard required reliance on data gathered from permanent monitoring stations, rather than indicative data obtained by use of transportable devices. The time taken to gather the verified data was approximately two weeks, and placed the community at risk from dangerous emissions from the mine' (Mine Fire Inquiry, 2014, part 4 p. 356). The Inquiry criticised the Health Department's decision to put its rules of scientific rigour above its use of pollution data collected from mobile devices of the Environmental Protection Agency (EPA). This coordinating effect hindered the early availability of data to guide their health advice to the local community. For example, the Health Department failed to order evacuation of nearby schools where the 'indicative data' and the 'untenable' conditions being experienced at a physical level provided sufficient evidence to warrant relocation of school students (Mine Fire Inquiry, 2014, part 4, p.357)

The Inquiry concluded that 'agencies should have acted on data available in the first week that showed significant, potentially dangerous emissions from the mine fire likely to affect the people of Morwell' (Mine Fire Inquiry, 2014, part 4, p. 292)

In another example**,** the Health Department and the EPA relied on their pre-existing 'bushfire' communication protocol to guide its community advice. The Inquiry was critical of this approach as the advisories in relation to smoke from the mine were based on the bushfire smoke protocol and were of 'little practical' effect and 'questionable' in relation to particulate matter pollution from the mine fire (Mine Fire Inquiry, 2014, part 4 p. 363).

The Mine Fire inquiry also criticised the Health Department's Carbon Monoxide Response Protocol, developed earlier for 'outdoor hazardous atmospheres. The policy advice to residents to 'shelter in place', that is to stay inside, did not take into account the length of time of this fire incident and also the failure of much of the local old timber housing stock to afford much protection (Mine Fire Inquiry, 2014 part 4, p. 334).

Moreover, the Inquiry noted that the Health Department Carbon Monoxide Response Protocol differed from that relating to the department's Health Management and Decontamination Plan for firefighters. That is, 'levels that were not considered safe for firefighters and required evacuation did not require the same response if the level was measured in the community' (Mine Fire Inquiry, 2014, part 4, pp. 335-337).

Overall, the policies of the government agencies, developed to deal with the issue of exposure to atmospheric pollution, even with some modification, were inadequate. The Inquiry concluded that the community was at risk because of this, and the discrepancy between safe levels of carbon monoxide exposure between community and firefighters 'could not be satisfactorily explained'. The Inquiry suggested that the length of exposure and level of exposure experienced required a rethink of existing policies.

In contrast, the local municipality, not bound by the more scientific and bureaucratic policies of the state level departments, acted more quickly to relocate near-by community care centres over which it had control. The evidence they used was the evident distress and discomfort experienced by centre users, rather than strict reliance on policies and scientific data. (Mine Fire Inquiry, 2014, part 4, p.322)

Complementary effects

According to Sydow et al. (2009) complementary effects that reinforce the path, are the symbiotic interactions of two or more distinct resources, rules, or practices that together either exploit synergies or avoid 'misfit costs'. This symbiosis deeply embeds these resources, rules, or practices so much that they rigidify them. Sydow et al. (2009) give the example of a complementary system of HR practices rigidifying the Fordist production system. The authors explain that over time, the organisation progressively exploits the symbiosis between its Fordist production goals and its system of HR practices. Eventually these HR practices become a dominant activity pattern so deeply embedded in the organisation that they contribute to rigidifying the production system.

In a review of crisis management control, Dayton (2009) notes the role of bureaucratic conflict and co-operation in the management of crises. In the case of the Hazelwood Mine Fire a governmental bureaucratic re-organisation in the period leading up to the fire was seen as contributing to regulatory oversight:

> The Hazelwood mine fire was a foreseeable risk that slipped through the cracks between oversight agencies, and as a consequence this reality must be confronted if similar incidents are to be avoided in the future (Mine Fire Inquiry, 2014, part 3, p.150).

To explain, from 1 January 2008, there was a transfer of responsibility for oversight of matters concerning mining hazards in Victorian mines from the Mining Regulator to the Victorian WorkCover Authority (VWA). From this date, the Mining Regulator no longer considered itself to have any role in regulating fire risk at the Hazelwood mine. Meanwhile, the VWA concentrated its resources on workplace safety policies and monitoring workplace risks that have the greatest potential to cause worker fatalities. In fact, the VWA definition of a 'major mining hazard' in the relevant mine safety regulations is:

> a mining hazard that has the potential to cause an incident that causes, or poses a significant risk of causing, more than one death.1

This interpretation by the VWA regulators became crucial in the owners' limiting of the policies on mine fire prevention to only health and safety and resulted in attention to fire safety only being on the operational areas of the mine where employees were working. The VWA mandate is 'prevention of death' and the 'safety of personnel'. Under VWA policy, a 'major mining plant fire' is a mining hazard of 'rare occurrence' albeit with

[1] Occupational health and Safety Mines Regulations 2002.

potentially ‘catastrophic consequences’ (Mine Fire Inquiry, 2014, part 3, p.164). The VWA policies never embraced a larger mine fire away from the operational areas and did not take into consideration that a fire could commence in areas other than in the active working part of the mine (Mine Fire Inquiry, 2014, part 3, p. 141). Under these assumptions, there was no consideration of the potential of fire ignition from external sources such as ‘ember attack’.

This is evidence of the symbiosis between organisational resources coming into play. The regulatory oversight of mine fire risk shifted to the VWA. The ‘dominant activity’ of the VWA is worker health and safety. Therefore, the risk of a widespread mine fire affecting the community at large slipped ‘off the radar’. A further discussion of this effect is in the section on ‘learning effect’ below.

As the Inquiry found:

> While the previously worked areas of the mine (batters and mine floor) are entered by employees/contractors to undertake periodic activities including inspection or maintenance work, the risk of one-off catastrophic incidents is significantly reduced compared to active areas of coal extraction. For that reason, directing resources away from the operational areas of the mine to the previously worked areas could not be justified from an occupational health and safety risk oversight perspective (Mine Fire Inquiry, 2014, part 3, p. 164)

Thus, while the VWA had regulatory oversight for mine fire prevention, its focus was on safety of employees. This symbiosis with complementary organisation resources resulted in a concentration on fire prevention for worker safety in the productive areas of the mine, and largely blind-sided both management and regulators to the risk of a widespread fire endangering the broader community.

Learning effects

According to Sydow et al. (2009), learning effects that reinforce the path occur when managers in the path become skilful in using previously chosen solutions. These managers continue to reinforce the existing path by refining and retaining past iterations. In preferring repetitive exploitation of past solutions, these managers are ‘blind-sighted’ to adopting efficient solutions (Sydow et al., 2009).

Through a series of policy changes, largely influenced by the interpretation of the definition of ‘major mining hazard’ (as discussed above) a concentration of fire protection in the operational area of the mine (known colloquially as ‘the slot bunker’) produced significant efficiencies in mine operations. Consequently, mine-wide fire protection services and the extensive fire management pipework installed prior to the 1990s became progressively disconnected and removed from the worked out areas of the mine and reinstalled only in the active areas of the mine.

A revised internal fire prevention ‘Policy and Code’ resulted in a situation in which:

> Clay or fixed spray breaks were no longer a minimum fire protection requirement so long as tanker filling points were provided within five minutes travel of any part of the worked-out areas (Mine Fire Inquiry, 2014, part 3, p. 198)

Further as the Inquiry noted:

> Unlike operational areas of the Hazelwood mine, there was no requirement to institute wetting down of exposed coal in worked out areas of the mine on high fire alert days. (Mine Fire Inquiry, 2014, part 3, p.222)

It appears, therefore, that the repetitive exploitation of efficiency solutions to mine fire safety delivered efficiencies in operations and met regulatory and policy requirements. Managers at the mine had learned: how to reduce fire prevention costs; manage the risks of a major mining hazard (being defined as a loss of life of one person); and mitigate mine fire hazards (a rare occurrence) with a system of hydrants across the mine.

Proof of the learned 'efficiency' of this approach, which neglected fire in the mine in locations other than the active mine occurred during the fire itself when:

> Hazelwood Power Station lost ninety percent of production for a twenty-four hour period. For the next forty-four days [of the fire] it was business as usual (Doig, 2015, p.62).

This approach proved inadequate to protect the environment and community in the face of widespread fire in the non-operational areas of the mine. As stated by the then emergency Services Commissioner for Victoria, this was:

> a massive blind-spot regarding the actual consequences of disasters (Doig, 2015, p.61)

Adaptive expectation effect

Sydow et al. (2009) argue that adaptive expectations effects contribute to organisational path dependence when individuals within the path respond to situations based upon their expectations, and expectations of expectations (Luhmann, 1995; Sydow et al., 2009). Sydow et al. (2009) use McGregor's (1960) Theory X and Theory Y as an example of adaptive expectation effects.

Despite forecast temperatures in excess of 40 degrees Celsius and fire warnings issued in the media by the State Premier and Emergency Services Commissioner, mine staff, managers and mine emergency services personnel made no provision for potential fire in the mine. Expectations at the mine over this code red fire day was 'business as usual'. As the Inquiry noted:

> Save for two additional contractors supplementing the usual weekend staff, no additional staff were rostered on. Senior managers should have been on site to take control of any fire threats within the mine to enable the 1x7 and 2x12 crews

> to fulfil fire spotting and suppression roles (Mine Fire Inquiry, 2014, part 2, p. 101)

In addition, the inquiry was critical of a failure to liaise with emergency services personnel by those staff that were on duty. There was also criticism of fire authorities for forwarding computerised fire risk modelling without an accompanying explanation. The Mine Fire Inquiry (2014, part 3, p.102) found that poor communication between the mine management and fire authorities resulted in a lack of understanding of the seriousness of the situation facing the mine on that weekend. The inquiry also noted that mine management failed to inform GDF Suez off-duty personnel involved with emergency command of information indicating a major threat.

The Inquiry noted the absence of senior staff in emergency management positions on the weekend of the fire. There was then an expectation by those in authority that lower level staff, in conjunction with fire services, could sufficiently cope with the rare occurrence of fire outbreak in the mine. The scale of events that unfolded were far in excess of what those on duty could manage. In addition, those on duty failed to see the need to call for further resources when the enormity of the threat began to emerge.

It is evident that staff expectations led to a pattern of behaviour that staff could not break from, even in the face of a serious threat to the community, the environment, and the productive area of the mine.

Findings and Discussion

The foregoing analysis has enabled the unpacking of the 'black-box' of path dependence as a contributing factor in the mismanagement of a crisis. In general application, the awareness of the elements of path dependence, and how they may individually or in combination contribute to organisational 'inertia', can assistant senior management in operational and regulatory roles to break-through the barriers that prevent a more agile responses to a crisis.

Co-ordination effects, of the rules and routines designed to create organisation efficiencies, may in fact inhibit effectiveness in a crisis situation. This was found to be the case in the mine-fire crisis. Senior managers should be prepared to re-consider the appropriateness of such constraints in a crisis situation and be prepared to consider action based on immediate need.

The complementary effects due to a symbiosis between distinct resources and rules can also act to further rigidify the ability of an organisation to respond in a crisis. Senior management of an organisation with responsibility to manage or prevent crises needs to be aware of the broader scope of risks, rather than those delegated more narrowly to itself.

The learning effects held by senior managers who continue to use previous, but no longer suitable, solutions can make these managers blind to new risks and their solutions facing an organisation.

Finally, expectations of management and staff that lead to a repeated patterns of behaviour are likely to prove inappropriate in a crisis situation. Organisation responses to crises need planned, practised, agile and adaptive responses to ensure reactions outside of the ordinary.

This paper has demonstrated that the path dependence model can be used to explain reactions from an historical point of view, but what is more important is its ability to provide managers with understanding of the effects that can lead to inertia and sub-optimal responses in a current crisis. It seems there is never a shortage of crisis situations to which the model could be used to understand organisational behaviour and hopefully, enable senior management to improve responses in a time of urgent need. The present (2020) COVID-19 pandemic provides such an opportunity.

CONCLUSIONS

In 2017, the private foreign owners of Hazelwood Power Station permanently closed its doors. The death of the Hazelwood Power Station and Mine caused a loss of jobs as well as huge loss of 25% of the state's available power (Doig, 2015). The owners reported this decision was due to the advanced aging of the plant (Engie 2016) and the high cost of installing safe working conditions making the 2025 decommissioning plan unviable. The owners, Suez, have remained at the coal site to manage the rehabilitation of the mine. The death of this power station and its coal mine is the end-stage of organisational path dependency (Sydow, Schreyogg & Koch, 2005, 2009).

While a detailed discussion of the environmental aspects of the lignite mine and power station operation is beyond the scope of this paper, it is noted that the closure of the operation was viewed as a positive from the viewpoint of reducing local environmental pollution and carbon dioxide emissions. Although environmental factors were never explicitly stated as being reasons for closure, there had been a long campaign by environmental groups to achieve this end. (Environment Victoria, 2019)

Adapting the model of 'organisational path dependency' developed by Sydow, Schreyogg & Koch, (2005, 2009) this research examines both the private and the public inter-organisational management of a mine fire crisis in the La Trobe Valley of Victoria, Australia. Path dependence is evident. Starting as a 100% public sector organisation, in which managers could make mine fire safety decisions unfettered by commercial reasoning, through events associated with new public management decisions of

Gwendoline Webber is a Teaching Scholar at Deakin University, Australia. E-mail: w.webber@deakin.edu

Richard Webber is Lecturer in Business Law and Taxation at Federation University, Australia. E-mail: rj.webber@federation.edu.au

disaggregating, corporatizing and privatising the public infrastructure, path self-reinforcing effects became entrenched and are observable with hindsight. The path self-reinforcing coordinating, complementary, learning and adaptive expectation effects identified by Sydow, Schreyogg & Koch, (2005, 2009) are evident in contributing to the lock-in of the inefficiencies, ineffectiveness and blind-sightedness contributing to the poor preparation and management of the 45 day out of control open-cut coalmine fire. This research also illustrates the process of inter-organisational path-dependency. Both the public regulator and the private owner contributed to being locked-in to an ineffective and inefficient situation that neglected best management practices for coalmine fire management and safety. This management 'lock-in' largely contributed to the sub-optimal emergency response, resulting in significant damage to community health, and generally poor social management of the Hazelwood Mine Fire Disaster of 2014.

REFERENCES

Australian Broadcasting News (2019a). *Victorian treasurer met Hazelwood owners over possible closure,* https://www.abc.net.au/news/2016-10-19/victorian-treasurer-met-hazelwood-owners-over-possible-closure/7947296).

Australian Broadcasting News (2019b). *Victorian first energy from waste project gets greenlight,* https://www.abc.net.au/news/2019-02-07/victorian-first-energy-from-waste-project-gets-green-light/10791686).

Australian Bureau of Statistics (2016) https://www.abs.gov/Home/Census

Barton, R., & Fairbrother, P. (2007). 'We're here to make money; we're here to do business': privatisation and questions for trade unions. *Competition & Change*, *11*(3), 241-259.

Benson, J. W. (1983). Industrial relations policy: a case study of organisational change. Churchill, Vic: G.I.A.E., School of Business and Social Sciences.

Benson, J. W. (1991). Unions at the workplace: shop steward leadership and ideology *Australian Studies in Labour Relations*. Melbourne, Vic: Oxford University Press.

Boin, A., Kuipers, S., & Steenbergen, M., (2010)The Life and Death of Public Organizations: A Question of Institutional Design? *Governance*, *23*(3), 385-410. https://doi.org/10.1111/j.1468-0491.2010.01487

Breznitz, D. (2010). Slippery paths of (mis) understanding? historically based explanations in social science. In G. Schreyögg & J. Sydow (Eds.), *The Hidden Dynamics of Path Dependence* (pp. 13-34). Basingstoke: Palgrave Macmillan.

Doig, T., *The coal face,* Penguin Specials

Engie (2016). *Media Release 03 Nove*mber https://www.engie.com/en/journalists/press-releases/hazelwood-power-station-australia/

Environment Victoria (2019). https://environmentvictoria.org.au/campaign/replace-hazelwood

Environment Protection Authority Victoria, (2019). https://www.epa.vic.gov.au/

Fischer, F & Miller, G.J., Handbook of Public Policy Analysis, Routledge, 2017.

Guy Peters, B., (2011). Governance responses to the fiscal crisis—comparative perspectives, *Public Money & Management*, *31*(1), 75-80, DOI: 10.1080/09540962.2011.545551

Kiess, J., Norman, L., Temple, L., & Uba, K., (2017) Path dependency and convergence of three worlds of welfare policy during the Great Recession: UK, Germany and Sweden. *Journal of International and Comparative Social Policy*. *33*(1), 1-17.

Kirk, E.A., Reeves, A.D., & Blackstock, K., (2005). Path dependency and the implementation of environmental regulation. *Environment and Planning C Government and Policy*, *25*(2), 250-268. DOI:10.1068/c0512j.

Hazelwood Mine Fire Inquiry. (2014). http://report.hazelwoodinquiry.vic.gov.au/

Hazelwood Health Study. (2016) http://hazelwoodhealthstudy.org.au

Garud, R., & Karnøe, P. (2003). Bricolage versus breakthrough: distributed and embedded agency in technology entrepreneurship. *Research Policy, 32*(2), 277-300.

Garud, R., Kumaraswamy, A., & Karnøe, P. (2010). Path dependence or path creation? *Journal of Management Studies, 47*(4), 760-774.

Latrobe Valley Mine Rehabilitation Commissioner (2017). https://www.lvmrc.vic.gov.au/latrobe-valley-mines/

Marty, G., & Préget, R., (2010) A Socio-Economic Analysis of French Public Timber Sales, *Journal of Sustainable Forestry*, *29*(1), 15-49, DOI: 10.1080/10549810903463395

Marshall, G.R., & Alexandra, J., (2016). Institutional path dependence and environmental water recovery in Australia's Murray-Darling Basin. *Water Alternatives, 9*(3), 679-703.

Nelson, R. R., & Winter, S. S. (1982). *An Evolutionary Theory of Economic Change*. Cambridge, Mass.: Belknap Press of Harvard University Press.

Sydow, J., Schreyögg, G., & Koch, J. (2005). *Organizational paths: path dependency and beyond*. Paper presented at the 21st EGOS Colloquium Berlin, Germany.

Sydow, J., Schreyögg, G., & Koch, J. (2009). Organizational path dependence: opening the black box. *Academy of Management Review*, *34*(4), 689-709.

Van Buuren, A., Ellen, G. J., & Warner J. F., (2016). Path-dependency and policy learning in the Dutch delta: toward more resilient flood risk management in the Netherlands? *Ecology and Society, 21*(4):43. https://doi.org/10.5751/ES-08765-210443

van Driel, H., & Dolfsma, W., (2009) Path dependence, initial conditions, and routines in organizations: The Toyota production system re-examined *Journal of Organizational Change Management*, 22(1), 49-72. https://doi.org/10.1108/09534810910933906

VicHealth, (2019), https://www.vichealth.vic.gov.au/

Weber, G., Cabras, I., & Frahm, L. G. (2019). De-privatisation and remunicipalisation of urban services through the pendulum swing: Evidence from Germany. Journal of Cleaner Production, 236, 117555.

Webber, G.E.(2012), *Path Dependence and Path Creation in Strategic Human Resource Management: A Comparative Study of Power Generators in the Latrobe Valley, Victoria, Australia.* PhD.

Wolfram Cox, J., & Hassard, J. (2007). Ties to the past in organization research: a comparative analysis of retrospective methods. *Organization*, *14*(4), 475-497.

About IPMR

IPMR The International Public Management Review (IPMR) is the electronic journal of the International Public Management Network (IPMN). All work published in IPMR is double blind reviewed according to standard academic journal procedures.

The purpose of the International Public Management Review is to publish manuscripts reporting original, creative research in the field of public management. Theoretical, empirical and applied work including case studies of individual nations and governments, and comparative studies are given equal weight for publication consideration.

IPMN The mission of the International Public Management Network is to provide a forum for sharing ideas, concepts and results of research and practice in the field of public management, and to stimulate critical thinking about alternative approaches to problem solving and decision making in the public sector.

IPMN includes over 1300 members representing about one hundred different countries, both practitioners and scholars, working in all aspects of public management. IPMN is a voluntary non-profit network and membership is free.

ISSN 1662-1387