

Do innovative organisations survive longer than non-innovative organisations?

**Initial evidence from an empirical study of
normal organizations**

Eleanor D. Glor

Adjunct Professor, York University, Toronto, Canada

**Editor-in-Chief, *The Innovation Journal: The Public Sector
Innovation Journal***

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ABSTRACT

The literature focuses on innovation as an adaptive mechanism. From functionalist and evolutionary adaptation perspectives, innovative organizational populations should be expected to survive longer than normal ones, because innovative organizations and populations should be more adaptive than normal ones. The mortality rates of innovative organizational populations have not been identified, however, and the proposition of lower levels of mortality has not been tested. While the mortality rates of a number of organizational populations are known from the literature, the normal mortality rate for organizational populations has not been established either. This paper sets the stage for comparison of innovative organizations and populations to normal organizational population by identifying normal organizational population mortality rates. It concludes by discussing the basics of determining the mortality rate of innovative organizational populations.

The approach to identifying normal organizational population mortality is demographic and the methodology a research synthesis of organizational population mortality studies described in the academic literature. It identifies the range of normal (mean) population mortality rates for all organizational populations assessed, and for the private (PS), non-profit (NPS) and public sectors (PSE) separately. A search of the literature for organizational population mortality studies found 33 published studies including one usable database (on the Internet). To assure only appropriate studies were included in the analysis, two criteria (screenings) were first applied to them: (1) unbiased study, covering a full population, and (2) not an outlier population. Twenty-eight studies met the standards set for the first screening and of these 21 survived the second screening. The expectation was that mortality rates would be highest in the PS; surprisingly, the highest mean mortality rates were discovered in the PSE (in the American federal government) followed by the PS. Should researchers be interested in studying innovative organizational populations using an organizational demography approach, recommendations are made as to how this could be done.

Key words: Organizational demography, organizational ecology, organizational mortality, organizational population mortality, public sector innovation, innovative organization, mortality of innovative organizational populations

¹ The author is grateful to anonymous reviewers for their helpful comments.

Introduction

Innovation has been promoted for all organizational sectors for two generations. We know little, however, about the impact of innovativeness on the survival of organizations or innovative organizational populations in any of the three societal sectors—the private sector (PS), non-profit (NPS) and public sector (PSE). To determine whether innovative organizational populations have different mortality rates than normal populations requires creation of a theory linking the effect of innovation on the mortality of its organization and its population, a methodology for tracking this link and the identification of a normal organizational population mortality rate against which to compare the results for innovative populations. This paper addresses the third element. First, normal organizational population rates are established. Then, suggestions are made for a methodology for researching innovative organizational populations. To discuss these issues effectively requires clarity of concepts, so the paper begins with a discussion of key concepts in organizational demography.

Definitions

An organizational population is all or almost all of the organizations in a population, a population being, for example, an industry or all of the newspapers in a country or all of the trade associations in a country or all of the departments and agencies in a government. It is proposed that in the public sector (the publicly-owned sector) a population is a government responsible for a wide territory and a wide range of programs and services, such as a provincial or federal or a large local government but likely not a small local government. Because a small local government is unlikely to provide all the services or to have all the departments that larger ones would have, for small local governments, the population level would be one level up—e.g., all small local governments in a state or province or regional municipality.

In order to allow for comparisons, organizations in this paper are defined as a group of people working together for common causes that are registered or captured as an organization in a reliable organizational population database. Organizational populations are groups of organizations that are homogeneous in an important way. They might, for example, be homogeneous in the product or service they produce or the methodology or technology they employ. It would not be important for determining their population that they employ staff, secure resources from banks or do business in a building. Populations are also at a higher conceptual level than organizations; e.g., divisions, directorates and ministries would be organizations while all of the departments/ministries/agencies in a government would be a population. As well, all non-profit organizations concerned with the same or a related topic (e.g. health) would be an NPS population. Likewise, all businesses (organizations) making the same or a related product and providing parts or services specific to those businesses would be a population. In this paper organizational populations are all or nearly all of the organizations in a government, or non-profit field or industry.

Distinguishing the Sectors. Perry and Rainey (1988) explored the distinction between the PS and the PSE. They indicated the PS is privately owned, seeks to make a profit, is funded privately, and is mostly controlled by the market. The PSE is owned by the public (via government), funded publicly, mostly controlled by polyarchy (governmental authority)

(Lindblom, 1977), and seeks to serve the public good. The NPS only tries to cover its costs, not to make a profit that is distributed to its members, is controlled by its members, and serves its stakeholder's goals, which are also communal goals. The goals could be, e.g. to support business/to provide day care services. Most studies in the literature limit their definitions (if given) to ownership.

What should be studied?

The creation, survival and mortality of different types of organizations have been studied, but the basic demography of organizational populations has not been identified. Most studies of organizational mortality focus on variables that correlate with higher mortality rates within a population (the study) rather than on the population's demography. Their approach compares organizations in the population that have died with those that have not, thus providing comparisons within populations but not comparisons across populations. To build organizational theory requires study both within populations and across them.

Barnett and Carroll (1995) identified general criteria for appropriate outcome variables to contribute to organizational theory: (1) measurable at the organizational level; (2) having broad applicability and therefore allowing comparisons across populations; (3) does not 'run down' as it gets used; (4) does not assume temporal equilibrium; and (5) can be compared across studies, even when studies use different designs and time periods. Barrett and Carroll favoured use of organizational failure or mortality as the outcome variable, because organizational mortality is comparable across organizations and populations of organizations. Its advantages as a measure include: (1) can be measured with a minimum of ambiguity and noise; (2) the usual modeling framework—hazard function models—allow for precise comparability across industries, firms, contexts and research designs; (3) it is not likely to run down over time; and (4) it is valuable for organizational theory as it is useful to both of the two main types of organizational change literature—that identifying selection mechanisms of organizational change (Barnett and Carroll, 1995) and that identifying adaptation mechanisms. The current paper does not examine innovations' and organizations' fates as a function of selection mechanisms such as resources, politics, organizational age and size, and environmental and ecological processes (Baum, 1996). Rather, the approach to the study of innovation used in this paper is the treatment of innovation as an adaptation mechanism that affects organizational mortality. The measure of survival utilized is mortality and the approach is demographic.

A demographic approach

Demography is the study of populations; human and organizational demography is a sub-field of sociology. Carroll and Hannan (2000) identified five conceptual organizing principles of demography: (1) a population perspective; (2) focused on the vital events of birth and death; (3) concentrated on the flows of events in time and the implications of events for population structure—age is the master clock in standard demographic analyses of biological populations, beginning with calculation of age-specific hazards (or rates), followed by comparisons of these rates across time and among various groups; (4) individuals are related back to the population through counting of events and distributional measures of the population such as the mean and variance in age; and (5) models of demographic systems possess a coherent and consistent internal logic that permits demographers to move freely

among the parts and levels of the system, confident that the consistency can be checked and that theory fragments can potentially be unified. In a common exercise of this logic, vital rates and population characteristics are used in analytical procedures to derive implications for population change and stability (Carroll and Hannan, 2000: 25—26). This study does not use age-specific mortality rates, but studies population-specific mean mortality rates. Age is, however, considered.

Organizational demography is based on studying all organizations in a population. A considerable number of studies in the literature consider a full population, such as the automobile industry or all the newspapers in a country. The current study looks at them all and attempts to draw conclusions about sectors. All of the studies in the PS or the PSE, for example, should say something about normal mortality rates in that sector. Individual studies must encompass normal populations. Normal organizational populations are ones that include a full population (preferably) or close to it or are representative of a full population and are therefore suitable for establishing a standard. Ideally, a normal mortality rate is determined by calculating the mean mortality rate of the population over its full lifespan.

This paper also outlines the definitions of mortality used by authors (in the tables, if a definition was provided) and the demographic methodology employed by organizational ecology researchers in identifying organizational and population mortality rates.² While some of the studies are replications, other studies are not. This is considered a valuable approach in meta-analysis (Eden, 2002). Differences that could interfere with the studies being comparable are discussed later in the paper and some papers are dropped from the comparison as a result. Employing organizational demographics, an attempt is made to establish mean mortality rates in three sectors and establishes normal mortality rates in organizational populations by examining all of the studies found providing the information required to calculate mean mortality rates in organizational populations.

Organizational mortality occurs when an organization disappears from the record. While this definition does not get into issues of how different any successor organizations might actually be, it is the most practical definition for tracking organizations. The mortality and survival of organizational populations has been explored in the organizational ecology literature. As with individuals, the focus has been the mortality of organizations and the mean yearly mortality rates of organizational populations.

Successful identification of an organizational population mortality baseline would (1) demonstrate the approach, which might also work for analyzing innovative organizational populations, and (2) establish standards/a baseline against which research on the impact of innovation on organizational mortality could be compared. Such a baseline would give researchers an idea of what a high and low mortality rate is among organizational populations is. This paper identifies such standards—an all-sectors organizational population mortality

² The main subjects studied by organizational ecologists have been organizational demography (organizational founding and failure) and explanations for demographic differences. Demographic differences have been explained by demographic processes (age and size dependence), ecological processes (niche-width and population dynamics, density dependence and community interdependence) and environmental processes (institutional and technological processes) (summarized in Baum, 1996, Table 1: 80-81).

rate and normal mortality rates in the NPS, PS, and PSE—and suggests how the impact of innovation on organizations could also be studied this way

The Approach Taken

The overall and sector mean mortality rates were developed by searching for and comparing published studies that included mortality data on an organizational population. The search discovered 33 published organizational mortality population studies, including a database published on the Internet that reported the necessary organizational demographic data. Each study had to include: number of organizations studied, period studied, and number of organizations that survived or disappeared or a mortality rate. These studies were then passed through two types of tests to be sure they could be used to determine organizational population mortality rates (details are provided later). Of the 33 studies, 28 passed the first screening, and of these, 21 passed the second.

Using a demographic approach, a mean organizational population mortality rate per year was calculated for each of the studies, if possible. This was done for all sectors as a whole and for the three sectors individually (PS, NPS and PSE). The objective was to identify normal organizational population and sector mortality rates. Normal means they were not outlier populations, namely studies that were not representative of their entire population or populations that could be expected to have higher or lower than normal mortality rates because of the characteristics of the populations studied (e.g. a study limited to successful organizations would be expected to have a lower than normal mortality rate).

Factors that can affect normalcy include outlier populations, censoring and challenges created studying organizations across borders and sectors. The outlier studies had mortality rates multiples larger than the normal ones. A number of demographic factors have been demonstrated in the literature to be associated with elevated organizational mortality, such as young and adolescent organizations (Stinchcombe, 1965; Freeman, Carroll and Hannan, 1983; Brüderl and Schüssler, 1990; Singh, House and Tucker, 1986a; Carroll and Huo, 1988; Carpenter and Lewis, 2004; Corder, 2004), small organizations (Hannan and Freeman 1977; Brüderl and Schüssler, 1990; Freeman, Carroll and Hannan, 1983), and recently changed organizations (Brüderl and Schüssler, 1990; Amburgey, Kelly and Arnett, 1993). Populations with a large proportion of organizations with such factors were considered outlier populations.³ Censoring was also an issue. Censoring exists when data is either not available or it is not used before (left censoring), during (middle censoring) or after (right censoring) the period under review. The challenges involved in studying organizations in different countries and sectors, and in working with studies constructed for other purposes were identified and where possible addressed; a mean mortality rate per study was then calculated and a cross-sector comparison made.

³ USA Federal Executive Department and Agency credit *programs*, used as a comparison group, had a high mortality rate per year. Caution should be exercised in drawing any conclusions about programs (Corder, 2004).

The paper outlines (1) factors involved in organizational demography and how published studies of organizational populations were identified and studied in order to identify their mortality rates; (2) the approaches taken to studying organizational population mortality; (3) the 33 studies of organizational demography found in the literature and the data and definitions used in them; (4) the challenges that emerged in comparing these studies and whether and how they were addressed; (5) the methodology and criteria used in this study; (6) results of the comparisons and their implications; (7) normal (mean) mortality rates for all organizational populations retained and for each sector; and (8) how a comparable methodology could be used to study innovative PSE organizations and populations.

Studies Reviewed

Thirty-three published studies (including one database) providing demographic data on organizations were found in the literature and on the Internet.

Private sector studies. Research on organizational survival and mortality in the privately owned, for-profit sector typically included all sizes of organization, even single-person businesses, which have very high mortality rates. Nine studies of PS organizational mortality were discovered, and their mortality rates were calculated where possible. The studies included all semi-conductor firms over 28 years, the Fortune 500 firms at two points over 20 years, newspapers in Finland, Ireland, Argentina and US Metropolitan areas, Pennsylvania phone companies to 1934, newly established worker-owned cooperatives in Atlantic Canada between 1940 and 1987, and almost all of a population of government registrations and deaths of PS organizations in Bavaria for a short period. Except for the cooperatives and Bavarian companies (which were dropped from consideration), all PS studies had mean mortality rates below 1 per cent/year. The lowest rates reported were among newspaper populations and the telephone industry in Pennsylvania. The PS studies are described in Appendix 1, and are analyzed later in the paper.

Non-profit sector studies.⁴ NPS organizations are privately owned but do not seek to make a profit. Except for Toronto voluntary social service organizations (VSSO), which were studied for a shorter period than the other organizations and only included changed organizations, the remaining five NPS mortality rates were well below 1 per cent per year (Appendix 2).

It was not possible to produce a mean from the Aldrich & Staber (1988) study of business interest associations as they calculated their results yearly, finding a mortality rate ranging from 0 to 0.025 per cent/year. This was in the range of the other studies and without much variation, and so it was included, as if the results were a mean (of 0.025%/year). Another study included close to a complete population of US national trade associations over 100 years, 1942 to 1983 being the most reliable period (Freeman, Carroll and Hannan, 1983). Aldrich, Staber, Zimmer and Beggs' (1990) study of US trade associations restricted mortality to disbanding, and thus only reported 10.6 per cent mortality, with a mean mortality rate of

⁴ While the non-profit sector is sometimes identified as the non-business, non-market sector, research has been done on both business and labour associations, so all non-profit organizations are included in this category.

0.13 per cent/year. They excluded from consideration associations that disappeared due to transformation, merger or absorption by other associations, and associations lost from the historical record. Had these excluded associations been included, along with disbanding, mortality would have been 32.7 per cent over 83 years, a mean mortality rate of 0.39 per cent/year. Both rates are low—less than 0.5 per cent per year. Hannan and Freeman (1988) reported the highest mean mortality rate (0.50 per cent/year), among US labour unions.

Amburgey, Dacin and Kelly (1994) studied all American credit unions for ten years, finding a 3 per cent total mortality rate. Small credit unions were much more likely to die than large ones. In their study of 389 VSSO that changed from 1970 to 1982 in Toronto, Canada, Singh, House, and Tucker (1986a), found the death rate initially rose sharply to age two, dropped until age four, rose to the maximum death rate at age five, declined monotonically to age ten, and then stabilized.⁵ Like Brüderl and Schüssler (1990) and Carroll and Huo (1988), they found a liability of adolescence. Freeman, Carroll and Hannan (1983) also found a liability of newness among USA national labour unions from 1860-1980. Typically of newly changed organizations, the VSSOs had the highest mortality rate. Garlock studied the Knights of Labor, which only existed as a national phenomenon from 1872 to 1896. As with the study of the Canadas, they were studied from their origin until they disappeared.

Public sector studies. In the PSE, governments were treated as populations and departments as organizations. Public sector organization (PSO) death and survival data was available for US, Irish, Canadian, German and Norwegian national governments (Appendix 3).

US federal government. Much of the quantitative research on PSO mortality has been done on American federal government executive departments. Most studies used the *United States Government Manual (USGM)*, the official handbook of the American federal government, as their source. It provides information on PSO of the legislative, judicial, and executive branches (USGM, 2008-09), and includes terminations and transfers of agencies.

American study of PSO mortality began with the study of organizational *termination* (Daniels, 1997). Kaufman (1976) defined the early character of this study by concluding government organizations were almost immortal, and that more PSO needed to be terminated. He took two readings of the number of organizations, 50 years apart. This methodology was problematic, as it only studied two points, thus creating a middle censorship bias that omitted organizations that were both created and terminated during the 50 year period. Kaufman's analysis also had other methodological flaws (Peters and Hogwood, 1988; Glor, 2011). Despite validity problems, Kaufman's research became canon in the early PSO termination literature—he was quoted erroneously as having shown that PSO are immortal (Brewer and deLeon, 1983: 390). Kaufman's (1976) and Carpenter's (2000) data neither included all federal government departments nor all of the organizations that were created and abolished during the period studied. It was not, therefore, a representative sample of the federal PSO population, and this conclusion cannot be drawn.

⁵ Birth was formal incorporation; death was ceasing to exist as a formal entity. Mergers were counted as deaths (only five mergers occurred).

Better quantitative studies of PSO survival and mortality in the US federal government followed (e.g. Peters and Hogwood, 1988; Lewis, 2002), and errors in the initial research were corrected. These researchers did not find that PSO were immortal. Peters and Hogwood (1988), who conducted the largest study, examined all initiation, termination and organizational succession three levels down in departments, independent agencies, the Executive Office of the President, and commissions in the US federal bureaucracy from 1933 to 1982. There were 2245 of these changes. In order to be consistent with other studies, termination (14 per cent) and organizational succession (49 per cent) are combined here, yielding 1414 deaths.

Lewis (2002) demonstrated the mortality pattern for US federal agencies was not immortality. Building on Carpenter's (2000) work by analyzing data that were not biased toward durability by studying young as well as old organizations, he studied organizations newly reported in the *USGM* from 1946 to 1997. The organizations therefore had no left censoring. Lewis reported an overall mortality rate of 62 per cent during the fifty year period, compared to Kaufman's 27 per cent mortality rate during an earlier 50-year period. Lewis considered the possibility that agencies created since 1946 have been less durable than those created prior to 1946. Agencies created prior to 1933 were more likely to be created by legislation but Lewis found no reason to deduce there were other differences among the periods. He concluded it is a myth that PSO have a low mortality rate. Carpenter and Lewis (2004) reanalysed Lewis' (2002) data on agencies (not executive departments): from 1946-97, 398 new agencies were created, of which 227 were terminated, 57 per cent mortality and a 1.12 per cent per year mortality rate.

Although it took time, accurate descriptions of US federal PSO mortality were created. By comparison, Corder (2004) examined programs, not organizations, from the *Catalogue of Federal Domestic Assistance (CFDA)*, which included both programs run by Cabinet departments and ones run by independent agencies. Including not only programs in existence in the starting year (1974), but also ones created after that date, he found a 56 per cent mortality rate in 26 years. The cumulative effects of short-term biases in termination produced a portfolio of programs heavily biased toward programs sharing characteristics of early survivors, which have high mortality rates.

Republic of Ireland. Based on the Westminster system, in the Government of Ireland (Eire) ministers are heads of ministries (departments). The 1922 Constitution limited the number of ministers who can be in Cabinet to 12, a number that was expanded to 15 in the 1937 Constitution; this limit remains. Some ministries that in Canada (the other Westminster system studied in the literature) are considered departments are not counted as departments in Ireland, including the Revenue Commissioners, the Attorney-General and the Office of Public Works (Hardiman and MacCarthaigh, 2010). They are treated as departments in this paper, to improve comparability with Canada. Despite the cap on the number of departments, responsibilities of departments changed considerably over time and departments were renamed as a result; renaming is considered organizational mortality. Hardiman and MacCarthaigh (2010) studied Irish government departments from 1959-2008. Eighteen departments were created and 19 abolished, to produce a remainder of 15, as required by law.

MacCarthaigh (2010), Verhoest et al. (2010) and Hardiman and Scott (2010) used a time-

series database of the Irish state from 1922, when the Republic was founded, to 2009 to review the number of *agencies*. Creation of 336 agencies was accompanied by 228 terminations in 2009. The New Public Management encouraged agency formation, followed recently by consolidation, reintegration, or deagencification, and especially agency terminations. Deaths included transfer to a sub-national level of government, split, absorption, merger, replacement and disappearance. At the end of the 1970s there were 57 Irish agencies, by 2009 there were 135 (MacCarthaigh, 2010).

Canadian federal government. In Canada the term *ministry* refers to an appointment received by a minister in the Cabinet. Staffed by public servants, *departments* serve the ministry. Sometimes a department serves more than one ministry. Currently the minister of Industry Canada, e.g., is also appointed as the Minister of Labour; both ministries are served by the same department, Industry Canada. Likewise, some ministers are responsible for more than one department, especially since the creation of portfolios. The Minister of Health, e.g., is the minister of three departments. Each is a department, but there is only one ministry and one portfolio.

Hodgetts (1956) researched the fate of departments of the Canadas, a British colony, from 1841 to 1867. The Canadas were formed by uniting the British colonies of Upper and Lower Canada, which later became the provinces of Ontario and Quebec within the Dominion of Canada (Canada). Starting with no departments, the departments of the Canadas increased to 17 and then all were abolished when Canada was formed in 1867. The period 1841-67 includes: the creation of the first departments of the government of the Canadas, all PSO created afterwards, a total of 49, and all departments abolished in the interim and in 1867, producing a 100 per cent mortality rate over 26 years.

Hodgetts (1973) also studied the ministries of Canada from 1867 to 1970. Canada initially consisted of an amalgam of three colonies (which became provinces)—the Canadas, Nova Scotia and New Brunswick (Canada now consists of 10 provinces and three northern territories). The Government of Canada was created in 1867 with 16 ministries, but was not yet a complete government. Except for one department transferred to the provinces, all departments (and the entire staff) of the Canadas were recreated as Canada. Over 103 years, Hodgetts described a political tradition of tight control of ministries and departments, sketching the departments existing in 1970 as “astonishingly little increase in the number of departments with which we began one hundred years ago” (Hodgetts, 1973: 98). Expansion occurred through internal expansion of departments and the invention of new types of organizations, as outlined by the Treasury Board of Canada.⁶

Glor (2011) asked whether this pattern of restrained numbers of departments continued beyond 1970, and considered whether Canada now has a large or small number of government departments (ministries) and whether there have been high or low creation and abolition rates. She used a database of federal departments similar to the *USGM* in the USA. This database was released on the Internet in 2010 by the Parliamentary Library, an organization reporting to the Parliament of Canada. It is a database of ministries created and abolished since 1867, identifying dates for creation of ministries and appointment of ministers. Glor studied the creation and mortality of ministries from the time of Confederation 1 July 1867 to 1 July 2010. Over 143 years, 117 departments were created and 85 were abolished, leaving 32 departments in place, a consistent number.

⁶<http://www.tbs-sct.gc.ca/gov-gouv/tools-outils/org-eng.asp>, accessed July 14, 2012, dated March 1, 2012.

German federal government. Adam, Bauer and Knill (2008) used a private publication, the *OECKL – Taschenbuch des öffentlichen Lebens*, listing the addresses of all politically relevant organizations in Germany, including federal agencies. Termination was defined as vanishing from the register or changing name and location at the same time. Termination was associated with public perception of organizational failure, dissolution of the organizational function, and the will to achieve gains in efficiency. Both terminations and privatizations were defined as mortality. Using the West German government as the starting point, the authors found 140 agencies were created and 22 died, from 1949 to 2006, a 0.27 per cent mean mortality rate per year over 57 years.

Norway. A searchable database of all organizational *changes* was developed through collaboration between the Norwegian Research Centre in Organization and Management (later the Stein Rokkan Centre for Social Studies) and Norwegian Social Science Data Services (NSD). All ministerial level changes in the NSD Database were searched by the current author from 1947-2010, the period available in the database.⁷ Although the database also included civil service organizations outside ministries, state-owned companies and governmental foundations, none of these was easily comparable with other studies. As a result, only ministries were considered so that the data was comparable with that for Ireland, Canada and Germany. A total of 33 changes to ministries were identified, including nine foundings and 24 endings. Two endings occurred by absorption, two by splitting, four by merger, 15 by complex reorganizations and one by pure disbanding. All types of endings were combined in this paper.

Challenges Comparing across Studies and Sectors

In calling for comparisons among studies of public organizations, so that hypotheses could be rigorously tested, Adam, Bauer, Knill and Studinger (2007) identified some difficulties in doing so that are applicable to this study. Most of their points apply to all three sectors, not just the PSE. They include: (1) conceptual variety and ambiguity in conceptualization of organizational termination; (2) deficient research designs, that include biased selection of data and insufficiently developed comparisons across countries, time and organizational subpopulations; (3) lack of comparisons across different periods of time; (4) lack of studies of homogeneous subpopulations of organizations and different levels of political systems (most government studies address the national level); and (5) lack of comparisons across countries.

This study attempted to address these demographic, theory and comparison issues. Each study was examined for definition of mortality, research design (quantitative studies of populations of organizations from numerous time periods were reviewed). Two criteria for inclusion in the study were applied: they addressed a full population and a mean mortality rate could be calculated and they studied a normal population. The mortality rates were calculated, standardized and compared, and national government departmental mortality rates were calculated and compared across the five countries that had been studied. While the studies focused on the fate of individual organizations, this paper uses that information to explore the patterns of mortality in and across organizational populations and sectors. The populations studied came from the PS, NPS, and PSE (national government departments, no studies of other PSE populations were found).

⁷<http://www.nsd.uib.no/polsys/data/en/forvaltning/internendringsliste?dep=&n=0&e=101&e=303&e=304&e=306&e=310&e=311&e=312&fra=1947&til=2011> Accessed 25 July 2012.

The data also needed to be comparable, involving two questions: First, could the sectors be compared? Second, were the databases comparable? Concerning the first issue, sectors have different goals and norms, sources of legitimacy and authority, forms and logics of exchange (Saz-Carranza and Longo, 2012). Researchers such as Simon (1998: 9-11) suggested that there is no sharp line of distinction between the PS and PSE, while others such as Rainey, Backoff, and Levine (1976) and Perry and Rainey (1988) contended they are different. The focus of those saying the sectors were similar was usually efficiency, motivation and management, rather than ownership (although ownership is sometimes mixed, but not in most of the cases studied). In this paper, the PS and PSE are distinguished through ownership, which many authors agree makes a difference to the goals, norms, source of legitimacy and authority of organizations (Saz-Carranza and Longo, 2012). Ownership is also related to source of funding. While there are differences among the sectors, they are also similar at some levels. All of the organizations attempted to survive (so this does not distinguish them) and all of them can disappear from the record (so they can be compared at this level). Without a population record, they cannot be studied demographically.

The second issue—determining whether the databases were comparable—also could be difficult, because of differences in the studies' constructions. Studies varied by (1) definition of organization, (2) definition of organizational mortality (especially in the PSE), (3) characteristics of organizations studied, (4) analytic methods employed, and (5) choice of data to study. These five issues are discussed below, in turn.

First, the definitions of organizations are sometimes not clear—in these cases authors assume the reader knows what an organization is. Some of the studies identified the bases for being included in the databases, others did not. One study indicated there were a few NPS organizations in a database that otherwise consisted of PS organizations (I believe it was the Finnish newspapers). While these challenges add uncertainty to the comparability, they are not the dominant factors at work. When the researchers assumed that readers knew what an organization was, they were probably right. When they assumed a government organization registering PS, NPS and PSE organizations was able to identify an organization, they were probably right. If the government agency, publication, professional association, or research group thought the organizations were comparable, this study accepts their judgments. Except in a few studies, the judgments could not be confirmed or challenged. Another definitional issue relates to the fact that organizations often were identified at the highest level of individual organizations (e.g. federal government departments rather than provincial ones). Except where sufficient information is given to allow for adjustments (and they are necessary), the definition used by a study (usually based on an existing government database) is accepted. When adjustments have been made, they are noted in the appendices.

Second, definitions of mortality varied somewhat, but can generally be described by the term *disappearance*. While a few initial scholars of the PSE (e.g. Kaufman, 1976 and those who repeated his study) insisted on the complete disappearance of an organization and all its components before acknowledging organizational death, almost all studies since then accepted that some functions are usually passed to other organizations when an organization disappears. Definitions are identified in the appendices. For purposes of this paper, organizational mortality occurs when an organization disappears from the record. This occurs because of abolition, splitting, amalgamation, merger, absorption, renaming, disbanding, and transfer to another sector (e.g. from the PSE to the PS). If the organization does not change its name or registration, as in downsizing, it

is considered the same organization though it may not be delivering the very same programs/services. Data from three studies were recalculated to observe this definition (two published in Aldrich, Staber, Zimmer and Beggs, 1990 and Peters and Hogwood, 1988).

Third, organizational characteristics have been the dependent variables by which many studies have sought to explain differences in mortality rates among organizational populations. Some populations include proportionately more small organizations, especially in the PS (e.g. Amburgey, Kelly and Arnett, 1993), while other populations have proportionately more large organizations (e.g. US federal agencies). Smallness has been shown to be positively correlated with mortality within studies (Hannan and Freeman, 1977). The methodologies used by the original authors—organizational correlations with mortality—are not relevant in demographic studies. Fourth, the studies varied in the data gathered and reported, from partial to whole populations to right, middle and left censorship. Some censoring turned out to be an important issue, as discussed later in the paper.

Fifth, different choices of data led to seven different approaches being taken in the 33 studies. (1) Only successful organizations were studied, the Fortune 500 (Hannan & Freeman, 1977), which could be expected to have longer life spans than normal populations. Normal populations are a mixture of successful and less successful organizations. (2) Only two snapshots were taken of the number of organizations. Authors identified the organizations in one year and then reviewed the database again years later to see which of the original organizations still existed and which had been abolished (Hannan & Freeman, 1977; Kaufman, 1976; Carpenter, 2000). This created left, middle and right censorship and other biases (Glor, 2011). (3) Discrete data were reported yearly, not over periods (Aldrich and Staber, 1988); as a result, a mean mortality rate could not be calculated on the whole population. (4) Starting in a certain year, researchers studied *new* creations and abolitions from that point in time to another point in time (Brüderl and Schüssler, 1990; Lewis, 2002; Glosser and Jochim, 2009; Carpenter & Lewis, 2004; Peters & Hogwood, 1988; Hodgetts, 1973; Norway ministries which are calculated below). These studies are not left censored, as no organizations are included which were already in existence. They are right censored, as some of the organizations survived past the end of the study. (5) Some studies started at a certain point, counted all organizations that existed already, and tracked them and new creations and abolitions for a certain period of time (Corder, 2004; Irish ministries). These studies are left and right censored. (6) Other studies started at the very beginning of a whole population and continued to a certain point (e.g. Amburgey, Kelly and Arnett, 1993; Carroll and Delacroix, 1982; MacCarthaigh, 2010; Hodgetts, 1973; Glor, 2011). These studies are right censored as the organizations continued to exist past the study. (7) One study (Hodgetts, 1956) started at the beginning of a government, and studied all new organizations until the government was abolished. Because it had no censoring and the government only existed 26 years, it had a higher mortality rate (100 per cent) than ones that were censored.

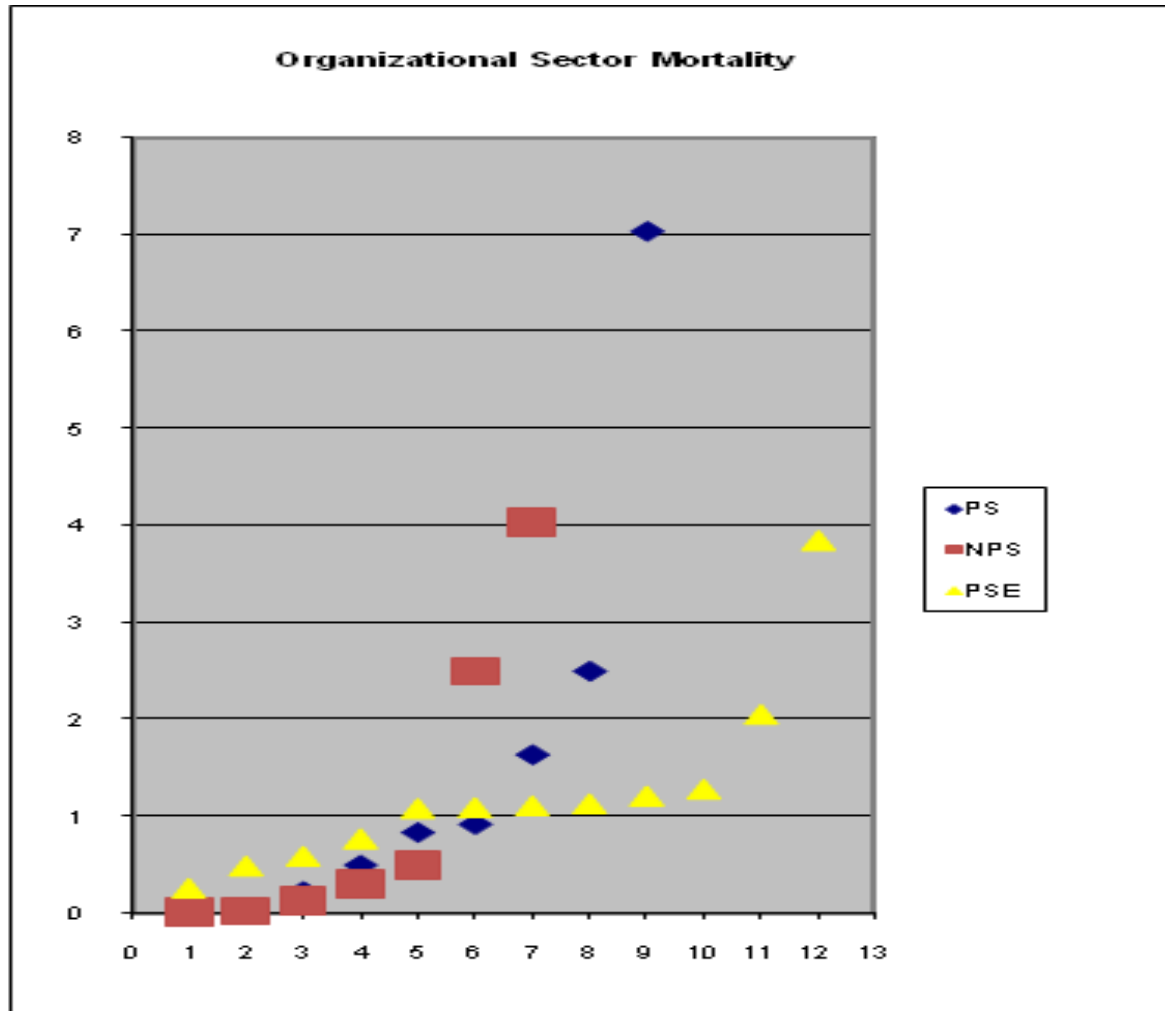
Methodology

The current study is a research synthesis but it does not use a meta-analytic methodology. Meta-analytic methods employ partial population data analyzed statistically as input and have developed methodologies for generalizing from these numerous statistical studies to populations (e.g. Mullen and Rosenthal, 1985; Hunter and Schmidt, 2004; Hedges and Vevea, 1998). Glass (1976), for example, who originated the term, defined meta-analysis as “the statistical analysis of a large collection of analysis results from individual studies for purposes of integrating the findings”. Mullen and Rosenthal (1985: 4) said much the same thing—meta-analytic techniques compare and provide a summary of significance levels or magnitudes of effect for an area of research. That approach is not needed here because each study is already descriptive of the full population.

Other analytic errors may have been possible, however. The three main errors possible in meta-analytic studies were considered. According to Eden (2002: 841), these are sampling, measuring and restriction of range errors. Sampling errors were not possible in this study, as it is a study of populations. Measuring error was possible in the definitions of organizations used by those who assembled the databases. The definition used was rarely defined in the articles. Most of the populations were put together by people highly familiar with the populations (e.g. industry associations and government officials responsible for collecting the data), however, they were probably the best people to put these definitions together—a researcher trying to understand a population might do a worse job. Consistency of definitions is discussed later. A second type of measurement error could be based on the definition of organizational mortality used. This was discussed earlier and the author is confident the data is quite (though not perfectly) comparable. It would be next to impossible to avoid this error in a synthesis of existing literature. It is worth keeping in mind, however. Restriction of range was also an issue and was addressed earlier under the section *The Approach Taken* as censoring. Almost all of the studies remaining in the final comparison had the same censoring, right censoring, and therefore studied a full population. Next, how the data was studied is described.

Each of the studies found in the literature and on the Internet was allocated to a sector (PS, NPS or PSE) and a mean mortality rate was calculated for each study. The 33 studies found are outlined and ranked by mean and sector in appendices 1, 2 and 3. The population studied is identified in Column 1, the mean mortality of the population is calculated in Column 2, the source of the study is identified in Column 3, the validity and reliability of the study is assessed in Column 4, and the definition of mortality used in the study is identified in Column 5. Whether populations were outliers and why is explained in column 4. The mortality rate was calculated by dividing the number of organizational deaths by the population size, giving the mortality rate in the population. The mean mortality rate per year was calculated by dividing the total mortality rate during the study by the number of years the population was studied. Column 2 categorizes the study period as long, medium, or short because many researchers have found that young organizations have higher and old organizations have lower mortality rates. Other researchers found the key factor was not age but size of organization, but this was not controlled for in most of the studies found in the literature. Yet other literature found change in organizations enhanced mortality rates. This literature is discussed in the introduction. Because most of the studies were of full populations, they included old + young, large + small, changed + not changed organizations.

Figure 1: Comparison of mean mortality rates per year among 28 private, non-profit and public sector studies



Notes: Vertical axis: mean mortality rate per year in populations. Horizontal axis: each point represents one study in a sector. For example, the results for 12 PSE studies are shown..

The table shows the range of mean mortality rates per year by sector (see appendices for more details).

Figure 1 compares the means of all the 28 studies for which a mean could be calculated by sector. The vertical axis represents mortality rates while the horizontal axis represents the individual studies ranked by mean. Most organizational populations in all three sectors have relatively similar mortality rates but each sector has outliers.

Excluded Studies

Whether studies reporting organizational population mortality were usable in this study of normal organizational population mortality rates was determined by applying two criteria: (1) whether the study effectively captured a full population and a mean population mortality rate could be calculated; (2) whether the population was normal (not an outlier).

An outlier could be expected to have a high mortality rate because it had a greater than normal proportion of organizations with characteristics known to be related to high mortality rates (e.g. young age).

The data for the *first screening* were taken from that published by researchers. Researchers favoured existing government databases as the source of data. In a few cases, databases were created by the authors from industry publications or through research. The most comparable studies covered full populations from their beginnings. They eliminated both left and middle censoring biases (e.g. Hannan and Carroll, 1992: 163-167). Two populations had died out, the Canadas (Hodgetts, 1956) and the Knights of Labor (Garlock, 1976), the rest were right justified. Twenty-one full populations were studied and an additional five studies covered full populations for a period of time in a region or industry. An example of the latter is the study of Manhattan fax companies. While the study covered all the fax companies in Manhattan, it only covered Manhattan. In the first screening this study was not removed but it was in the second.

Studies varied somewhat in their approaches to organizational mortality. Important factors were population studied; definition of mortality used; data included (whether they were full populations, number of years included, historical period covered, biases in data collection), and whether absolute data such as totals (as opposed to the results of tests) were provided. Absolute data were needed. Methodologies used to analyze the studies were not important, as the impact of these differences was on the time series analyses rather than on the mean. Most studies used broad definitions of mortality. Those that did not were not considered because they were also middle censored (see below). If necessary and possible, recalculations were made to count mortality the broader way. Only some publications provided absolute data so that means could be calculated. The ones that did not were removed from consideration. Data is presented by sector—PS, NPS and PSE. Means could not be calculated if studies did not report original counts, reported short and long term data separately, or had middle censoring. While studies that only included one or some geographic areas (e.g. Brüderl and Schüssler, 1990; Freeman, Carroll & Hannan, 1983) risked the characteristics of the organizations being unique not universal for the country, if they included a whole population within that area, or close to it, they were used, with caveats. The study that reported mortality yearly was included because the range of scores was so small that it approximated a mean—the very low yet highest score (0.025%/yr) was used as mean.

Regarding censoring, studies were *included* which were right, left and right, and not-censored. Middle censored studies were *excluded*, as they were too biased, they were inconsistent with other studies, and a mean could not be calculated (Fortune 500 and Kaufman, 1976). To summarize, five studies were removed by applying the first criterion—in the PS, the Fortune 500 and the largest US Bank Holding Companies (BHCs), and in the PSE, the Kaufman (1976), Carpenter (2000), and Korean quango⁸ (Park, 2013) studies. None of these three studies covered a full population. In addition, the Kaufman and Carpenter studies only included the most successful organizations and only included two snapshots of the data, creating middle censorship, a serious bias.

⁸ In countries such as Republic of Ireland and the UK, quangos are quasi-autonomous non-governmental organizations to which the government has devolved powers.

Following the first screening, the studies that remained in the current study included: (1) in the PS, newspaper, telephone and semi-conductor firms; (2) in the NPS, the Knights of Labor, labour unions, trade associations, credit unions, and social service organizations; and (3) in the PSE, the federal governments of Ireland, Germany, Norway, Canada, and the USA. The 28 studies remaining after the first screening were compared, in order to identify the pattern of mortality rates among populations, sectors and national governments and the effect of censoring. The 28 studies were considered at the level of definition of mortality, validity and reliability of studies, censoring, mortality data, and normality. The studies were ranked from lowest to highest mean mortality rate per year in appendices 1, 2, 3). While the mean obscures the effects of yearly variance in the mortality data, it provides a common indicator for comparison among studies, countries, and sectors.

The *second criterion* for inclusion of a study in the comparison considered whether the study captured a normal population, since the study sought to identify normal organizational population mortality (by sector). This screen identified six outlier studies—they did not represent normal populations. The PS outliers were (1) a different kind of frequently troubled organization (worker coops) and (2) a study done differently from the other studies (the Bavarian study only covered the first few years of the organizations' existence and many very small organizations). The NPS outliers covered only the early period of the VSSO organizations' existences and only organizations that changed (Singh et al., 1986b) and a no-censorship and medium life span population (Garlock, 1974). The PSE outliers included a no-censorship population (Hodgetts, 1956) and medium (Hodgetts, 1956) and short life programs (Corder, 2004). An organization whose population died out completely can also be expected to have an unusually high mortality rate, especially when it only had a medium lifespan). Troubled, young, small, changing organizations have previously been demonstrated to have high mortality rates. The outlier populations had unusually high levels of factors associated with short organizational life.

These six populations also had exceptionally high mean mortality rates per year. In the PS, the Atlantic Worker Coops over 47 years had a mean mortality rate of 1.64%/year and the Bavarian businesses over 9.25 years 7.03%. In the NPS, the Knights of Labor over 24 years had a mean mortality rate of 4.04% and the changed Toronto social service agencies over 11 years had a mortality rate of 2.5%. In the PSE, USA credit programs (2.06%), and the no-censorship Canadas (3.85%) had the highest rates. These outliers (Fortune 500, Atlantic cooperatives, new Bavarian businesses, changed social service agencies, Knights of Labor, the Canadas) were removed from consideration when establishing normal mean mortality rates. The analysis of the populations remaining and the results of the comparisons are examined in the next section.

Results and Analysis

The mean yearly mortality rates of the 21 studies compared (Table 4) ranged from 0.01 to 1.29 per cent per year (compared to 0.01 to 7.03 prior to screening). Means in the NPS ranged from 0.01 to 0.50 per cent, in the PS from 0.015 to 0.924 per cent and in the PSE from 0.27 to 1.29 per cent. The mean yearly mortality rate for all studies of all normal populations was under 1.3 per cent/year. The upper portion of Table 4 contains studies that

had the lowest mortality rates per year—all were right censored only. The PSE rates were somewhat higher than the others. The bottom portion of the table includes only studies with higher mortality rates, especially PSOs. Although two have left and right censoring, most are right censored only. Among PSO, the two populations with both left and right censoring were in the middle range of means. In all three sectors the pattern is one of resilient organizational populations, with low mortality rates. All NPS studies had mortality rates under a mean of 0.51 per cent/year, all PS studies under 1 per cent/year, and all PSE studies under 1.3 per cent/year.

The censoring biases in the remaining studies did not seem to matter much. Among the 21 studies, 19 were right censored and two were both left and right censored. All six PS studies were right censored, while five of six NPS studies were only right censored and one was left and right censored. Among the 10 PSE studies, nine were right censored and one study was right and left censored. The two populations censored both left and right had mortality rates of 0.3 and 1.1 per cent/year; the 19 right censored populations had mortality rates of 0.01 to 1.29 per cent/year. While young populations had higher mortality rates than medium-term and older populations, none of the studies covered a period of less than 10 years as it takes time for databases to be published and patterns to be established. Organizations tracked for long periods of time had small mean mortality rates per year.

In the PS, Finnish newspapers had the lowest mortality and Argentine newspapers had the highest. In the NPS, all US national labour unions had the lowest mortality rate, all US labour unions had the highest. In the PSE, the US government had the highest mortality rates per year and the Norwegian government the second highest. The German government had the lowest mortality rate per year and the Canadian government had the second lowest. The mortality of Irish government departments was in the middle. Contrary to conventional thinking, and whether or not the outliers were removed, mean mortality rates in the PSE were somewhat higher than in the other sectors. A considerably larger portion of the PS and NPS studies had mortality rates per year that were lower than the lowest PSE study rate: 43 per cent of PS studies and 50 per cent of NPS studies had mortality rates per year lower than the lowest PSE rate of 0.27 per cent. The American, Norwegian and Irish governments all had mortality rates higher than the highest rate in the PS. In addition to these three governments, the Canadian government also had mortality rates higher than the highest rate in the NPS. Only the German government had rates similar to the PS and the NPS. Unlike the PS and NPS, 60 per cent of PSE studies had mortality rates over 1 per cent/year. The mortality rate per year in the PSE was generally higher than in the other sector studies.

The promotion of organizational death as a political, public policy and organizational objective has occurred only in the PSE and the PSE literature, not in the PS nor the NPS literature. This campaign could be a factor in the higher PSE mortality rates. Caution should be exercised in interpreting this comparison in the PS, however, as four of the six PS studies were from one industry—newspapers.

Conclusion

This study identified the mortality rate of normal organizations and populations by doing an analysis of organizational population mortality reported in the literature. The normal organizational mortality rate was also identified in the PS, NPS AND PSE. Information was reported from 33 organizational population studies, the most comparable being studies of full populations that were right censored. Once biased studies and outliers were removed, baseline mortality rates were calculated for 21 organizational population studies—all mortality rates were under 1.3 per cent per year. The baseline for NPS studies was under 0.51 per cent/year, for PS studies under 0.93 per cent, and for PSE studies under 1.3 per cent. These organizational populations were resilient. The somewhat higher PSE mean mortality rates were a surprising finding. The PS tended to have higher mortality rates than the NPS and the PSE to have higher mortality rates than both other sectors. Fifty per cent of PS and 60 per cent of NPS studies had mortality rates per year that were lower than the very lowest PSE study rate.

At the same time, it should be recognized that all of the normal mean annual mortality rates were somewhat similar and low. Three conclusions can be drawn about this similarity: (1) normal populations of organizations have low mortality rates; (2) the mean mortality performance of organizations in the different sectors is not highly different; and (3) PSE organizations have somewhat higher mean mortalities than other sectors.

Although data were available for a goodly number of populations, these nonetheless still covered a limited number and range of populations (there are so many). The overall mortality rate of less than 1.3 per cent per year is probably usable in comparisons. Caution should be exercised in applying the mortality rates for the PS and NPS to other populations as a limited number of studies were found. The PSE results are also probably usable, as more studies were found. A start has been made toward understanding organizational population mortality rates and identifying a baseline against which the mortality rates of innovative and changing organizations, especially in the PSE, could be compared.

Suggestions for Research on Innovative Organizational Populations

The exploration of the effect of PSE innovation on organizational survival is a question at the center of a research agenda that would require agreement on definitions of innovation, innovative organization and organizational population, and methodologies.

One approach to defining PSE *innovations* is Glor's (1997a: 3-4), focusing on unique initiatives and unique implementation. She defined a PSE innovation as the first, second or third time a new policy, program or process was introduced by a government on a continent. A second approach is that typically taken by award programs. They define innovations as the introduction of a policy, program or process in a new context. This allows an innovation to be as limited as introduction of something new in a unit that has never introduced it before. The innovation is unique to the organization but the innovation itself is not necessarily unique. Glor described this approach as a focus on dissemination: "The dissemination of new activities or ideas emphasizes the adoption of innovations, and treats all adoptions as innovations, independent of how long the ideas have been around" (1997b). A third

approach could define innovations as the first, second or third times a product, program, process or policy is introduced in a population. This definition would be measurable and identify activities that were noticeably new. Rather than focusing on the organization, this definition emphasizes newness to the population.

According to Glor (1997a), *innovative organizations* are ones that have introduced many innovations. For research purposes, a specific number of innovations could be chosen, or a ratio to existing initiatives. An innovative organization could also be defined absolutely as an organization that was the first, second or third organization to introduce a specific number of innovations. This could, however, produce a situation where laggard organizations/governments are being recognized most as innovative and as the most innovative. Because laggards have delayed implementation of innovations and reforms over time, when they do a turn-around (perhaps with new leadership), they introduce many innovations. While there could be good promotional reasons for recognizing them as innovative organizations, the research would be addressing dissemination of innovations in newly innovative organizations. There could therefore be two kinds of innovative organizations, those that innovate regularly and consistently, and those that periodically introduce major innovative efforts. The relationship between adoption of innovation and organizational survival might be different in these two kinds of innovative organizations. In both cases, normal organizations would introduce a few innovations occasionally but innovative organizations would do so frequently, regularly, or periodically.

An *innovative population* is a population composed of many innovative organizations. An approach to researching innovative populations would be to compare two populations—a putatively innovative and a putatively normal PSE population (government), identify the number and magnitude of innovations the populations' organizations introduced during similar periods, their innovativeness under different governments, and compare the fates of their organizations. It would be important to be able to distinguish the impact of innovations and of ideology on the fate of the organizations. Normal organizational populations would introduce innovations occasionally, but innovative organizations would do so regularly or even frequently. To distinguish innovative organizations and innovative organizational populations from normal ones, it must be possible to tell them apart.

The analysis in this paper established baseline mortality rates for organizational populations to which the mortality rates of innovative organizations and populations and new organizational population studies can now be compared. Cases must be studied where there is a plausible link between an organization being innovative and surviving. If it clear, for example, that a PSE organization was privatized because an ideologically right wing government was elected that was privatizing government organizations on principle, this case is not relevant for judging whether being innovative enhances survival. Ideologically-oriented innovations and organizational survival or mortality must be carefully documented, nonetheless because it is plausible that innovative governments are more ideological, and that their organizations are therefore at greater risk of mortality. If possible, in studies of innovative populations, right censored studies are recommended (i.e. studies that cover organizational populations from their beginnings or that only include organizations from their beginnings), as there will be many more normal population studies with which to compare results.

Researchers should now develop data bases of the creation, survival and mortality of innovative organizational populations and/or innovative organizations, leading to consideration of the demographics of innovative organizations and whether innovation has been adaptive for organizations. To isolate the effect of innovativeness, researchers should study innovative organizational populations and normal organizational populations in historical pairs in order to be able to eliminate some historical and ideological factors as causes. The research should compare their creation and mortality rates to the rates of their sectors and to mean normal organizational mortality rates as well as to each other. Organizations should be matched for level of organization in the hierarchy—innovations should be studied at the same organizational level in the organizational hierarchy (Rousseau, 1985), magnitude (substantiality of the innovations (enough to affect their organizations, amount of funding and human resources), management and political support, and ease of termination/ whether the innovation was institutionalized (Boin and Goodin, 2007; Boin and Christensen, 2008). To assure studies are comparable, researchers need to coordinate their efforts by developing common definitions of innovations, innovative organizations and populations, survival and mortality (The definitions of mortality used in the literature are outlined earlier in this paper.) Formal rules for forming and terminating organizations should be documented. Information on the factors that others have identified as being relevant to mortality should also be collected, e.g. organizational niche (Freeman and Hannan, 1983), newness (Singh et al, 1986a), size, resources, institutional design (Boin, Kuipers and Steenbergen, 2010), institutionalization (Boin and Goodin, 2007), environment (e.g. politics). New factors should also be considered, e.g. in the PSE, do terminations result from the closing of a niche or from a niche being over-crowded? If enough organizations and populations were so compared, it might then be possible to assess across sectors and countries whether innovation is adaptive for the survival of PSE organizations. Of course, while the survival of the innovating organization is a necessary condition for an innovation to be implemented, it is not a sufficient condition for the innovation's or the organization's survival. Political leaders may be more interested in whether innovation improves outcomes and organizational leaders may want to focus on the impact of innovation on organizational performance.

About the Author:

Eleanor Glor worked for four levels of Canadian government and for the United Nations Association in Canada, a non-profit association during her career as a practitioner. She is Editor-in-Chief and Publisher of *The Innovation Journal: The Public Sector Innovation Journal* (www.innovation.cc). She is also Adjunct Professor in the School of Public Policy & Administration and Fellow, McLaughlin College, York University, Toronto, Canada. She has written extensively on public sector innovation. Eleanor can be reached at: eglor@magma.ca.

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Appendix 1: Mortality rates of private (for-profit) sector organizations

Population Studied	Ranked Mortality Rate	Source	Study Validity/ Reliability	Definition of Mortality
<i>All Newspapers, Ireland</i> 1800—1975 Period covered: 175 yrs	During the 175 years: 897 organizational deaths Population size (N) =1017 Total mortality: 897/1017=88.2% The population was considered over the long term. Mean mortality: 88.2/175 =0.5%/year Mean mortality rate (mean mortality divided by 100): 0.005%/yr	Carroll & Delacroix 1982	Study began close to beginning of industry Little left censorship. Right censorship	Disappearance due to failure or (infrequently) success; merger; absorption of subordinate partner.
<i>All Newspapers, Argentina</i> 1800—1900 100 yrs	1346 deaths, N=1457, Mortality: 92.4% Long term Mean mortality rate: 0.009%/yr	Carroll & Delacroix 1982	Event history from beginning of industry Hazard function Tuma's Maximum Likelihood Program Right censorship.	Same as above i.e. disappearance
<i>All Newspapers, 7 Metro Areas, USA</i> 1800-1975 175 yrs	About 474 deaths, N = 2768 Short term mortality rate: 15.7% of 2,768 Mean short-term mortality rate: 0.089%/yr Long Term mortality rate: 2.4% of 2,768. Mean long-term mortality rate: 0.014%/yr	Freeman, Carroll & Hannan 1983	Life histories of newspapers in 7 metropolitan areas. All newspapers in those areas for which identifiable birth and death rates available. Little left censorship. Right censorship. Did not represent whole population of USA newspapers	Dissolution, absorption i.e. disappearance
<i>All Newspapers, Finland</i> 1771—1963 192 yrs	33 deaths, N = 1011 Mortality rate: 3% of 1011 Long term Mean mortality rate: 0.015%/yr	Amburgey, Kelly, Arnett 1993.	Retrospective study of a population. Quantitative. No left censorship. Right censorship.	Ceased publication i.e. disappearance
<i>All USA producers of semi-conductors,</i> 1951—79 28 yrs	About 75 deaths, N = 1,159 Medium-term mortality rate: 6.5% Short-term mortality rate: 36% Medium-term study Mean mortality rate: 0.232%/yr	Freeman, Carroll, Hannan 1983	A full population Almost no left censorship Right censorship.	Dissolution, absorption i.e. disappearance
<i>USA all early Pennsylvania telephone companies</i> 1861—1934 73 yrs (mutual & commercial co.)	36% short-term Long-term study Mean mortality rate: 0.232%/yr	Barnett, 1994	Life histories, maximum likelihood & instantaneous rate of failure analyses A population No left censorship. Right censorship.	Dissolution i.e. disappearance
<i>Fortune 500</i>	Small businesses: 8%/yr,	Hollander	Fate of existing successful	Merging or

Population Studied	Ranked Mortality Rate	Source	Study Validity/ Reliability	Definition of Mortality
firms, USA 1955—75 20 yrs	Mortality 78% in 20 years Large businesses: mortality 25% in 20 years N=500 Medium-term study Mean mortality rate: Small 3.9%/yr Large 1.25%/yr	1967; Bolton 1971; Hannan & Freeman 1977: 959	companies Poor. Small and large organizations reported separately. Identified success & failure Left & right censorship.	disappearing i.e. disappearance
Atlantic Canada Worker Cooperatives 1940—1987 47 yrs	158/205 new co-ops Mortality: 77.1% Long-term Mean mortality rate: 1.64%/yr	Staber 1989	Coops from provinces of New Brunswick, Nova Scotia and Prince Edward Island A population Fate of new cooperatives Right censorship Outlier: completely different kind of corporation, with higher mortality, and all new coops.	Disappeared from coop list (Discontinued incorporated cooperative) i.e. disappearance
All Facsimile Companies, Manhattan From beginning 1965-92 27 yrs	New & old co's. 114/170= 67.1%/27= 2.49%/yr	Baum, Korn & Kotha, 1995	One city only. High reliability Not a population Not usable	Disappeared from the White and Yellow pages of the phone book
Almost all new & dying companies, Munich & Upper Bavaria, Germany 1980—31 March 1989 9.25 yrs	155,415 usable of 171,502 cases of newly founded industry, trade & service businesses (mostly individuals) Mortality: 65% Short-term Mean mortality rate: 7.03%/yr	Brüderl & Schüssler, 1990 Personal correspon- den- ce with Dr. Brüderl, 6 January 2009	Complete set of business registrations & deregistrations. New companies incl. one-person companies. A population, Event history or survival analysis. High validity. No left censorship. Right censorship. Outlier: short-term study	Company deregistered i.e. disappearance

Notes:

1. For all tables, time period definitions: Short term—15 years old and under (studies included 9.25, 10, 10, 11, 11 years), medium term—16 to 30 years old (studies included 22, 26, 27, 28 years), long term—over 30 years old (studies ranged from 43 to 192 years).
2. Studies of the American brewery industry were not included because the industry has such a peculiar profile. It began in about 1800 (Carroll and Wade, 1991), disappeared in 1920 with prohibition, and had only 43 firms in 1983 (often the data reported is for breweries not firms, which is the unit of study in this paper) (Carroll and Swaminathan, 2000: 716).
3. N = population size

Appendix 2: Mortality rates of non-profit organizations

<i>Population Studied</i>	<i>Ranked Mortality Rate</i>	<i>Source</i>	<i>Study Validity/ Reliability</i>	<i>Definition of Mortality</i>
USA Business Interest Associations - membership mostly manufacturing companies 1883-1983 1942-83 best data 100 yrs	Initial death rate: reported yearly. Range: 0 to 0.025 mortality rate Long-term study Mean treated as 0.025%/yr because of small range.	Aldrich & Staber 1988	Retrospective Makeham model Close to a population. Only right censored	<ul style="list-style-type: none"> • Dissolution • Merged/absorbed • Ceased, no remnants • Transformed • Stopped operations i.e. disappearance
All USA National Labour Unions 1860-1980: 120 yrs (National means active in more than one state)	N = 476 Initial mortality rate: 5.9% Long-term mortality rate: 1.2% Mean mortality rate: 0.01%/yr	Freeman, Carroll & Hannan 1983	Life histories of all national unions Retrospective Makeham model A population Only right censored	Dissolution, Absorption i.e. disappearance
USA Credit Unions 1980-89 10 yrs	611 deaths/20,248 credit unions, mortality rate: 3% Short-term study Mean mortality rate: 0.30%/yr	Amburgey, Dacin & Kelly 1994	Event history A population Left & right censored	Liquidation & assisted merger i.e. disappearance
USA Trade Associations (Asso.) 1900-1983, 83 yrs of national asso., plus 17 yrs of regional associations preceding the national ones.	355 disbanded, 77 transformed, 460 merged/absorbed, 199 lost in the records = 1091 deaths 2248 still active in 1983. T population=3339 associations with known founding dates Mortality rate = 1091/3339=32.6% Long-term study Mean mortality rate: 0.393%/yr	Aldrich, Staber, Zimmer & Beggs 1990	Close to a complete listing Event history analysis Log-odds or logit, logistic regression. High Almost no left censorship Only right censored	Authors' definition: disbanding Recalculated to include disbanding, merger, absorption, lost. T mortality= 1091 i.e. disappearance
USA Labour Unions 1836-1985 149 yrs	461 deaths: 191 disbandings, 140 mergers between national unions, 130 mergers with unions of equal status to form new unions; 160 still surviving. T population=621 unions Mortality: 74.2% Long-term Mean mortality rate: 0.50%/yr	Hannan & Freeman 1988: 35-36	Retrospective A population High reliability Only right censored	Disbanding & merger i.e. disappearance
All new Toronto voluntary social service organizations 1970- 1982 11 years	Deaths: 107/389 (N=270 for structural change data). Mortality: 27.5% Short-term Mean mortality rate: 2.5%/yr	Singh, House, and Tucker 1986b	Retrospective. A population of changed VSSO Event-history analysis Time-varying covariate model High reliability Right censored Outlier: all organizations new	Birth=formal incorporation. Death=ceasing to exist as a formal entity. Merger same as death (only 5). i.e. disappearance

Population Studied	Ranked Mortality Rate	Source	Study Validity/ Reliability	Definition of Mortality
American & some international Local Assemblies of Knights of Labor 1869-1896	11,202 died/ 11,502 created = 97% mortality rate / 24 yrs = 4.04% mean mortality rate/yr Garlock (1974: 13, Table 35) found membership of 778,000 in 1886, the peak year.	Garlock, 1974; Carroll and Huo, 1988	Retrospective Makeham model A population. Left and right censored	Main source: Failure to report and be published in Knights' official <i>Journal of United Labor</i> or <i>Proceedings</i> of the General Assembly, indicating no annual report had been provided by the local to the National Trade Assembly.

The local assembly was the basic structural unit of the Order (Garlock, 1974: 22). Carroll and Huo (1988) identified a total of 11,851 local assemblies from 1869-1973; Garlock (1974: 21) says 15,000 local assemblies were created from 1872-1896. Mean mortality could not be calculated for the Carroll and Huo data. Garlock (1974: tables 22 and 23) indicated 11,502 local assemblies were created. The latter figure is used as there is mortality data available related to it.

Appendix 3: Mortality rates of public sector organizations

<i>Population Studied</i>	<i>Ranked Mortality Rate</i>	<i>Source</i>	<i>Study Validity/ Reliability</i>	<i>Definition of Mortality</i>
USA Federal Executive Agencies + Presidential Office 1923-73 50 yrs	N=421 Mortality rate: 27% Long-term Mean mortality rate: 0.54%/yr	Kaufman 1976	Studied some executive departments Poor - biased toward agency durability, only 2 points compared, at different creation stages Left, middle & right censorship & other biases	Survived: Listed in USGM* in 1923 & 1973, as of 1976. Death: Disappeared from USGM
USA Federal Agency Birth & Death 1946-97 51 years	262/423 Mortality: 62% Long-term Mean mortality rate: 1.21%/yr	Lewis 2002.	High A population No left censorship, right censorship	Birth: New listing in USGM after 1945. Death: Disappeared from USGM.
USA Federal Government Agencies Created 1946-1997 51 years	227/398 Mortality: 57% Long-term study Mean mortality rate: 1.12%/yr	Carpen-ter & Lewis 2004	Reanalysed Lewis, 2002 data. High. Constructed numerous models, incl. ordinary logit, log-logistic, generalized gamma & Cox models. They tend to overestimate agency hazards early & underestimate them later (p. 218). No left censorship, right censorship	Disappeared from USGM.
USA Federal Executive Agencies 1865-1923 58 years	27 terminated 135 bureaus created Mortality: 20% Long-term study Mean: 0.35%/yr	Carpen-ter 2000, Table 1	Medium Biased toward agency durability Covers >98% of agencies created (p. 229) A population Left, middle & right censorship	Listed in USGM in 1865 & 1923. Disappeared from USGM.
Federal USA Agency Birth & Death 1946-97 51 years	250 terminated/ 450 agencies Mortality: 55.5% Long-term study Mean mortality rate: 1.09%/yr	Glosser & Jochim 2009	Reanalyse Lewis' data (2002) High Event history analysis (hazard rate) A population No left censorship, right censorship	New listing in USGM after 1945. Disappeared from USGM.
USA Federal Executive Departments & Agencies 1933-82 49 years	314+ 1100 =1414/2245 Mortality: 63% Long-term study Mean 1.3%/yr When existing organizations included, mortality 35%/49 yrs, mean mortality rate: 0.71%/yr	Peters & Hog-wood 1988	All USA Federal Executive departments & agencies Every USGM initiation, termination & succession was recorded. A population of changes High No left censorship, right censorship	Peters & Hogwood only included terminations as deaths (24%). Data was recalculated in current study to include both terminations & successions as deaths. Disappeared from USGM
USA Federal Executive Department & Agency Credit Programs	Existing 1974 & newly created: N= 216 Mortality 55.6% Medium-term	Corder 2004	High A population Left and right censorship	Date of last entry in the <i>Catalogue of Federal Domestic Assistance (CFDA)</i> . i.e. disappearance

Population Studied	Ranked Mortality Rate	Source	Study Validity/ Reliability	Definition of Mortality
1974- 2001, 27 years	Mean mortality rate: 2.06%/yr			
Irish government departments 1959-2008 49 yrs	19 died 16 remaining in 1958 + 18 new = 34 created Mortality: 55.9% Long-term Mean mortality rate: 1.1%/yr	Hardiman & MacCarthaigh 2010.	High (assessed from data provided in same way Glor, 2011 Canadian data assessed) A population Left and right censorship	Disappeared from database. Department considered abolished even if new department with similar name created.
Irish government agencies The year of the Republic's founding, 1922-2009 87 yrs	228 terminated, 336 created Mortality: 67.9% Long-term Mean mortality rate: 0.78%/yr	MacCarthaigh 2010, Verhoest et al. 2010, Hardiman & Scott 2010	Time-series database of Irish national-level state institutions constructed by UCD Geary Institute, University College Dublin http://www.isad.ie/ A population No left censorship, right censorship	Death=organization disbanded, no replacement created, functions not transferred to another organization. Termination = transfer to a sub-national level of government, split, absorption, merger, replacement & death i.e. disappearance
Canadian federal government departments Year of founding, 1867-1970 103 yrs	68 created, 42 abolished Mortality: 62% Long-term Mean mortality rate: 0.60%/yr	Hodgetts 1973	Excellent A population No left censorship	A ministry disappears as a legal entity
Canadian federal government departments Year of founding, 1867-2010 143 yrs	85 abolished , 117 created** Mortality: 73% Long-term Mean mortality rate: 0.51%/yr	Glor 2011	Excellent A population No left censorship	A ministry disappears as a legal entity
West German Federal Agencies (all) 1949-2006 57 years	14 terminated, 8 privatized, total died=22 of 140 federal agencies. Mortality: 15.7% Long-term Mean mortality rate: 0.28%/yr	Adam, Bauer & Knill 2008	High A population. No left censorship	Federal government agency listing in OECKL. An agency is terminated (14) or is privatized (8). i.e. disappearance
Norwegian State Administration Database 1947-2010 63 yrs All changes to ministries	24 disbandings of 33 creation & disbanding events Mortality 72.7% Long-term Mean mortality rate: 1.15%/yr	NSD website Rolland & Roness 2011.	A population of changes. Database did not include existing ministries, only new foundings and endings No left censorship http://www.nsd.uib.no/civilservice/	Organizations: non-temporary organizations with full-time employees Death: absorbed, split, merged, pure disbanding, complex reorganization i.e. disappearance

Population Studied	Ranked Mortality Rate	Source	Study Validity/ Reliability	Definition of Mortality
Canadas (now Ontario & Quebec) departments From year of founding to abolition 1841 to 1867. 26 years	33 abolished, 49 created, during government, rest abolished in 1867. Mortality: 100% Full term. Mean mortality rate: 3.85%/yr	Hodgetts 1956	Excellent A population No left or right censorship	Birth: Department created by law 1841-1867. Death: A ministry disappears as a legal entity
Korean Agencies 1993-2010 17 years	39 agencies terminated of 108 Mortality 36%/17yrs = 2%/yr	Park, 2013	Korea has 3 types of agencies, of which only two are covered by the study, so not a full population. The omitted type has mostly small agencies so the study includes a disproportionate number of large quangos. Left & right censored. Not a population Fairly short time period covered. Not valid. A mean for the population could not be calculated.	Termination includes reorganization—merging, splitting, shifting to the PS, but not change of name.

** Including the first 16 departments created in 1867, which was an incomplete government.

Abbreviations: USGM = United States Government Manual; OECKL = *Taschenbuch des öffentlichen Lebens*.

Appendix 4: Comparison of 21 ranked mean organizational mortality rates by sector

Private Sector		Non-Profit Sector		Public Sector	
<i>Population Studied</i>	<i>Ranked Mean Mortality Rate/ Yr</i>	<i>Population Studied</i>	<i>Ranked Mean Mortality Rate/Yr</i>	<i>Population Studied</i>	<i>Ranked Mean Mortality Rate/ Yr</i>
<i>All Newspapers Finland P</i> 1771- 1963 192 yrs Right censored	0.015%/yr Long-term Amburgey et al. 1993	<i>All USA National Labour Unions P</i> 1860-1980 120 yrs Right censored	Long-term: 0.01%/yr Initial: 0.64%/yr Freeman et al. 1983	<i>All German Federal Agencies P</i> 1949-2006 57 years Right censored	0.27%/yr Long-term Adam et al 2008
<i>All Newspapers, 7 Metro Areas, USA NP</i> 1800-1975 175 yrs Right censored	Short term: 0.089%/yr Long-term: 0.014%/yr Freeman, et al. 1983	<i>USA Business Interest Associations AP</i> 1942-83 43 yrs Right censored	Reported yrly. Range: 0 - .025%/yr Long-term Aldrich & Staber 1988	<i>All Canadian federal government P</i> Year of government's founding, 1867-2010 143 yrs. Right censored	0.51%/yr Long-term Glor 2011
<i>USA Semi-conductor Firms P</i> 1951-1979 28 yrs Right censored	0.232%/yr Medium-term Freeman et al. 1983	<i>USA Trade Associations AP</i> 1900-1983, 83 yrs. National population Right censored	0.128%/yr Long-term Aldrich, Staber, Zimmer & Beggs 1990	<i>All Canadian federal government P</i> Year of government's founding, 1867-1970 103 yrs Right censored	0.60%/yr Long-term Hodgetts 1973
<i>All Newspapers, Ireland P</i> 1800-1975 175 yrs Right censored	0.504%/yr Long-term Carroll & Delacroix 1982	<i>USA Credit Unions P</i> 1980-89 10 yrs Left & right censored	0.3%/yr Short-term Amburgey, Dacin & Kelly 1994	<i>All Irish government agencies P</i> Year of Republic's founding, 1922-2009 87 yrs Right censored	0.78%/yr Long-term MacCarthaigh 2010
<i>USA all early Pennsylvania telephone companies P</i> 1861-1934 73 yrs Right censored	0.84%/yr Long-term Barnett 1994	<i>All USA Labour Unions P</i> 1836-1985 149 yrs Right censored	0.50%/yr Long-term Hannan & Freeman 1988: 35-36	<i>USA Federal Agency Birth & Death P</i> New listing in USGM 1946-97 51 years. Studied Lewis, 2002 Right censored	1.09%/yr Long-term Glosser & Jochim 2009
<i>All Newspapers, Argentina P</i> 1800-1900 100 yrs Right censored	0.924%/yr Long-term Carroll & Delacroix 1982			<i>Irish government departments P</i> 1959-2008 49 yrs Author's analysis Left & right censored	1.1%/yr Long-term Hardiman & MacCarthaigh 2010 data
				<i>USA Federal Government Agencies P</i> New listing in USGM 1946-97. 51 yrs. Reanalyses Lewis, 2002 Right censored	1.12%/yr Long-term Carpenter & Lewis 2004
				<i>Norwegian State Administration P</i> 1947-2010	1.15%/yr Long-term Calculated

Private Sector		Non-Profit Sector		Public Sector	
<i>Population Studied</i>	<i>Ranked Mean Mortality Rate/ Yr</i>	<i>Population Studied</i>	<i>Ranked Mean Mortality Rate/Yr</i>	<i>Population Studied</i>	<i>Ranked Mean Mortality Rate/ Yr</i>
				63 yrs All ministerial changes Right censored	from HSD website
				USA Federal Agencies P New listing in USGM 1946-97 51 yrs Right censored	1.21%/yr Long-term Lewis 2002
				USA Federal All Executive organizations P 1933 to 1982 49 yrs Initiations, terminations, organizational successions Right censored.	1.29%yr Long-term Peters & Hogwood, 1988

Abbreviations: P=full population, NP=not a population, AP=almost a full population

Note 1: Yr stands for Year