

Synthesis Memo: Evolutionary and Organizational Ecology Perspectives

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Evolutionary and ecological perspectives on organization theory and strategic management predominantly focus upon the firm's relationship with its environment over time. This emerged as an alternative to the notion that firms consciously adapt to changing environmental conditions in order to survive. Hence, the key assumption in evolutionary and ecological perspectives on organizations is the notion of selection of the firm by the environment, as opposed to conscious buffering and/or adaptation of the firm to changing environmental.

Moreover, the evolutionary perspective (Nelson, 1995) emphasizes the importance of history, cumulative action, and consequent path dependences and inertia. Together, these frame a particular challenge for firms with respect to environmental fit over time. Since the environment can change (sometimes rapidly and extensively), firms need to adapt with it. However, due to path dependences and inertia, this is far easier said than done.

This perspective emerged from the notion that managers and organizations face limitations in their capacity to adapt. At the individual level, there is environmental uncertainty and imperfect information (Alchian, 1950). At the organizational level, there are established internal and external structures and processes that create inertia (Hannan and Freeman, 1977). The stronger these limitations, the more plausible the evolutionary/ecological explanation for firm survival becomes relative to the adaptation perspective.

Overall, the population ecology and evolution perspectives can be distinguished from the adaptation perspective through their focus on equilibrating pressures *over time* at the environmental rather than the firm level. This means that the environment “optimizes”, by selects the population of firms that is able to exist at that point.

Broadly, these papers concern a tension between environmental change, learning and inertia, which brings up questions such as: how do firms really behave in uncertain environments (e.g. Alchian, 1950)? What are the environmental underpinnings of isomorphism? (e.g. Hannan and Freeman, 1977)? How do environments really evolve over time (e.g. Nelson, 1995)? How does organizational learning and adaptation improve chances of survival over time given high environmental complexity, and as a result, when is a firm most vulnerable to failure? Are all firms susceptible to a liability of newness (Stinchcombe, 1965), or can they delay this through initial resource endowments (Carroll and Hannan, 1989)? How does the intensity of competition factor into this (Le Mens et al. 2011)?

This synthesis memo will briefly discuss the six papers of the session that address these questions, whilst rounding out the key principles of the population ecology

and evolutionary perspectives. First, it introduces notions of environmental uncertainty and the logical fallacy of “profit maximization” under such conditions (Alchian, 1950). Thereafter, it discusses the population ecology perspective in more detail by rounding out the biological metaphor and its implications for organizational theory (Hannan and Freeman, 1977), and then focusing upon research on the relationship between the firm’s age and its vulnerability to failure at both the organizational level (Stinchcombe, 1965; Le Mens et al., 2011) and population level (Carroll and Hannan, 1989). Finally, I revisit the assumption that environments “optimize”. This is addressed by the evolutionary perspective in economics (Nelson, 1995), which centers on path dependencies and inertia across levels of analysis.

Alchian's (1950) paper was among the earliest to introduce the assumptions of uncertainty and imperfect information and foresight to the neoclassical economic perspective. He begins by challenging the notion of "profit maximisation", arguing that this is meaningless unless pursued under conditions of absolute certainty. The existence of uncertainty means that possible outcomes take the form of a range of possibilities rather than a finite expectation. Firms hence pursue positive profit rather than maximum profits; a more modest yet attainable endeavor, since positive profit is essentially the condition for survival (i.e. this means that they are better suited to their environment than competitors).

Alchian also argues that the notion of environments "adopting" firms (which therefore survive) is equally as plausible as firms adapting to their environment to survive. Firms are hence susceptible to chance and luck - analogous to the flower that grows on the sunny side of the building rather than the shaded side - and individual motivation and foresight are therefore not necessary prerequisites for survival. This is not to say that susceptibility to chance and luck is akin to the entirely random allocation of resources and decisions. Alchian does assume that firm adaptation occurs at the helm of individuals with some degree of purposive motivation and foresight, but, on the other hand, that motivation and foresight are not the same as outcome. Moreover, when faced with the same available evidence, people may not necessarily make the same decision when faced with some uncertainty. Alchian's key argument is therefore that such survival need not necessarily be attributed to perfect foresight, since if there are enough firms, with sufficient variation between them, one or more will inevitably survive some exogenous environmental shock.

Alchian suggests that environmental uncertainty induces managers to identify “successful” organizations and imitate them, rather than progress through trial and error. This observation is echoed in Hannan and Freeman’s (1997) article on population ecology perspective. However, in contrast to Alchian’s suggestion of conscious adaptation/imitation at the firm level, Hannan and Freeman emphasise selection pressures at the population level as an important, yet largely overlooked, driver of isomorphism across organizations.

Hannan and Freeman (1977) round out the individual-population-community bio-

ecological analogy in organization theory, in which the firm is aggregated to the role of individual, the population refers to a group of similar firms that are characterized by a similar vulnerability to exogenous shocks, and the community encompasses all individuals and populations affected by the same environmental shocks.

One of Hannan and Freeman's main contributions is in their evaluation of isomorphism in competitive and pluralistic environments. They suggest that the two equilibrating (or "optimising") forces for isomorphism are conscious adaptation and selection against non-isomorphic firms over time, and place a specific emphasis on the latter. To distinguish between the two as optimising forces, one must ask: "who is optimising, and what is being optimised?" From a population ecology perspective, it is the environment that is doing the optimising through selection. From an adaptation perspective, it is the firm that consciously adapts to its environment. Hence there exists both organizational rationality, and environmental rationality, and whilst these may coincide, their alignment becomes increasingly unlikely in more complex competitive environments. In short, optimisation for the environment rarely aligns with optimisation for the individual.

The population ecology perspective hence focuses upon the selection component of isomorphism (though acknowledges that both selection and adaptation are valid). Hannan and Freeman (1977) develop a model of competition that hinges upon the capacity of the environment to support forms of organization and the rate at which the populations grow (or decline) when the environmental support changes. In this, equilibrium is achieved when there exists only one population that is isomorphic to the environment at that point in time. This has policy implications for fostering competition and market expansion, for example replacing local, idiosyncratic market constraints with broader, universal ones that prevent a push toward specific local populations

The nature and pace of environmental change also has implications for the management of excess capacity (slack resources) through a generalist (rather than specialist) strategy. Slower, more modest environmental changes favor a generalist strategy, through which slack resources can be reapplied, through these become largely irrelevant in turbulent environments where they no longer hold relevance and the rapid change required is unachievable.

For researchers, this has empirical implications for the types of firms to study (large firms are less susceptible to exogenous pressures due to slack and incumbent resources, interdependences and network positions), sample sizes (larger sample sizes will provide a clearer reflection of ecology predictions) and time periods (even the largest firms will fall if the time period is long enough).

The following three articles deal with firm susceptibility to failure as a function of its age, by asking: when is an organization most vulnerable to failure? This line of inquiry began with Stinchcombe (1965), who introduced the notion of *liability of newness*. This fundamentally assumes that firms learn over time, and they are

therefore most vulnerable to failure during their early history, since it takes time (and hence cost) to settle into new roles, develop routines, accumulate trust and understanding amongst strangers, and build the strong relationships that enable efficient operation.

However, Carroll and Hannan (1989) suggest that firms are born with some initial endowment that provides some “buffer” against failure. They study this by looking specifically at the notion of density delay, which suggests that firms are more likely to fail if they are conceived when competition is higher, though this will occur after some delay due to the immunity provided by initial endowments. At the population level, this helps explain the tendency for organizational populations to decline after reaching a peak rather than stabilizing. High density manifests in resource scarcity for new firms that hinder development and push the organization into a niche.

Hence, the density at founding has a persistent positive effect on organizational mortality rates, and overall the mortality rate is a U-shaped non-monotonic function of density (i.e. the mortality rate falls with increasing density to some point and then rises with further increases in density). This means that both delayed density (from the density at founding) and contemporaneous density (ongoing density effects) are affecting the organization as it ages.

Le Mens et al. (2011) extend this study (though at the organizational level of analysis rather than the population) and integrate what became a disparate pool of empirical findings regarding the relationship between the age of an organization and its failure hazard. Le Mens et al. harmonise previously contrasting accounts by drawing a distinction between stocks of resources and flows of capabilities, as well as being consistent with levels of analysis.

The key point here is that firms learn over time through engagement with their environment. However, learning on its own to develop capabilities and increased appeal in absolute terms is insufficient in a competitive environment, since they need to do so better than their competitors to ensure a positive net resource flow that keeps the firm above the fitness threshold. When a firm falls below the fitness threshold their stock of resources begins to deplete (thereby increasing the failure hazard) and the firm fails when this runs out. Thus, the firm can either be most vulnerable to change at its inception, in its adolescence, or as it gets older, in accordance with its relative initial endowment and its rate of learning (actual appeal) relative to its competitors.

Finally, I revisit the assumption that the environment is “optimizing” through its selection of isomorphic firms. Evolutionary theory in economics presents an account of industry evolution that deviates from the neoclassical assumption of a moving equilibrium, and suggests that the assumption of an “optimizing” environment is naïve. Evolutionary economics sees industry evolution as unfolding through time and susceptible to random variation, with strong inertial forces limiting elements that survive the selection process. Hence, the perfect, uninterrupted implementation of a plan is not considered an evolutionary process,

and organizational strategy within evolution is heavily path dependent.

Nelson (1995) reviews theories of evolution in: (1) different social and organizational spheres (e.g. science, technology, law and business organizations); (2) evolutionary models of economic growth as fuelled by technological progress (i.e. both the development and subsequent adoption/dissemination of individual technologies); (3) path dependencies, dynamic increasing returns (e.g. snowballing adoption, cumulative technology and dominant designs, network externalities and product complementarities), and the evolution of industry structure (small firms and low entry barriers => emergence of dominant design => realisation of latent scale economies, consolidation, increased entry barriers and shake out). Moreover, the emphasis in evolutionary theory is on coevolution, whereby "progress" in one area (e.g. gasoline vehicles) may hinder progress in another (e.g. electric vehicles).

These accounts of economic evolution therefore center around the coevolution of technology, industry structure and supporting institutions. Nelson reviews recent theory on institutions, which provide the selection environment in which firms exist. He further argues that institutions (encompassing implicit assumptions and beliefs, and the 'rules of the game' for a given context) are innately complex, path dependent and evolving in parallel, and as such it would be naive to suggest that these could be "optimized" through conscious adaptation.

Furthermore, this problematizes the adaptation perspective by asking: how much are firms really able to adapt (e.g. imitate another's strategy)? Inertial limitations to adaption resulting from path dependences set the scene for disruptive (competence destroying) innovations and significant industry change through creative destruction.

Overall, the population ecology and evolutionary perspectives emerged as a response to the rigidities and unrealistic assumptions of other models, such as neoclassical growth model of industry change (assumes moving equilibrium), and the adaptation perspective on firm learning. Whilst formal neoclassical models may espouse more decisive-predictive capacity, evolutionary and ecological explanations tend to reflect the true complexity of the empirical world more comprehensively.