

Outsourcing from a (Theoretical) Evolutionary Perspective

*Rob Dekkers [e-mail: rob.dekkers@glasgow.ac.uk]
Adam Smith Business School, University of Glasgow, Glasgow G12 8QQ, U.K.*

Abstract

Outsourcing has been long considered from a number of theoretical perspectives, such as transaction cost economics and the resource-based view, but studies have not been informed by a (theoretical) evolutionary biological perspective. However, canonical theories have insufficiently accounted for its long-term effects, the risks associated with the decision and the phenomenon of back-sourcing. To this purpose, the paper presents a complementary view that counteracts some of the controversies raised in literature. This perspective leads to an outline of an evolutionary framework that could inform further research into the effectiveness of decision making on outsourcing.

Keywords: Evolutionary models, mutations, outsourcing.

Introduction

One possible avenue has been insufficiently explored for outsourcing: evolutionary models. Particularly, Mahnke (2001, p. 373) has advocated the role evolutionary models could play for managerial decision making without expanding on it. Some have referred to sources that propagate evolutionary models; for example, Doh (2005) refers to Nelson and Winter (1982), but then connects it to the resource-based view (Doh, 2005, p. 699). Others (e.g. Mirani, 2006) view evolutionary processes as staged development. Nonetheless, these studies are not incorporating models from (theoretical) evolutionary biology. Using these (theoretical) evolutionary models could lead to reference models for outsourcing and more effective methods for decision making on outsourcing.

Objectives of Paper

It should be noted that Mahnke (2001) relates the evolutionary perspective to a number of works that have taken this approach in a somewhat different manner. By way of illustration, he (*ibid.*, p. 358) mentions the work of Teece et al. (1997). This work relies on the resource-based view and the perspective of dynamic capabilities. However, for the resource-based view its inadequacy has been mentioned by Priem and Butler (2001) and for outsourcing proven by Dekkers (2011, p. 959). Although the dynamic capability perspective is newer, works (e.g. Ellonen et al., 2009; Vogel and Güttel, 2013) are propositional and only refer to outsourcing (e.g. Ellonen et al., 2009, pp. 757, 760; Vogel and Güttel, 2013, pp. 434, 437) rather than developing models or methods for decision making. This implies that the potential of a perspective from (theoretical) evolutionary biology has been untouched, even in the context of dynamic capabilities.

Although the dynamic capabilities perspective integrates the temporal dimension, the long-term perspective is missing in other canonical theories used for outsourcing. For example, Dekkers (2011, p. 959) finds that transaction cost economics, the resource-based view and core competencies are providing inadequate descriptions for long-term effects. The inclusion of the long-term perspective is necessary, because Kinkel et al. (2008)

show that some German companies backsource as regret for the preceding decision to outsource. Also, the studies cited in Fratocchi et al. (2014) demonstrate this interest in bringing back manufacturing that was previously internationally outsourced or captive offshored. This means that theories used for outsourcing should cover the long-term effects, but existing theoretical conceptualisations could also be considered inadequate.

Therefore, the central question of this paper is whether and how models and methods for decision making on outsourcing derived from theoretical evolutionary biology will yield insights that encompass long-term effects, associated risks and reduce the probability of backourcing. This theoretical stance leads to the following questions:

- How can (theoretical) evolutionary biology inform decision making on outsourcing?
- And to what extent, can models and methods derived from this perspective lead to mitigating some of the risks and the long-term effects associated with outsourcing?
- How can this evolutionary perspective inform future research?

Scope and Outline of Paper

This new perspective may result in more effective models and methods for decision making on outsourcing. Hence, it addresses the gap noted for building theory (Dekkers et al., 2017; Busi and McIvor, 2008, p. 193). Furthermore, it extends the conceptualisation beyond evolutionary models based on replication of organisational routines (Nelson and Winter, 1982). Finally, although some (e.g. Mahnke, 2001; Tate et al., 2009) have referred to evolutionary processes, these have been limited to distinguishing phases and learning. Therefore, the evolutionary perspective adds possibly insight not yet embedded in theory.

The first step in the development of this complementary insight is discourse about appropriateness of models from (theoretical) evolutionary biology for organisations; this will be related to making decisions on outsourcing in this second section. The third section discusses briefly implications of this theoretical framework to inspire further research. A discussion of findings and a concluding section complete the paper.

Appropriateness of (Theoretical) Evolutionary Models for Outsourcing

The use of evolutionary biological models for outsourcing assumes an analogy between firms and organisms. According to Hodgson (1993, pp. 18–19), analogies and metaphors are not just literary ornaments but their use implies approaching reality from various perspectives and should be used with utmost care. Of course, one should always remain open to the possibility that they are misleading, incomplete, inaccurate or even inappropriate (Morgan, 1997, p. 5). An analogy in microeconomic theory is that firms, industries or even countries as a whole behave like individuals (the corporation as legal entity (Bakan, 2004)). This may be an appropriate analogy for understanding certain aspects of economic decision-making, but as a general model may suffer from serious shortcomings. However, some, such as Nelson and Winter (1982, p. 11), denounced pursuing biological analogies for their own sake or for the purpose of developing a general evolutionary theory applicable to both natural and social sciences. Keeping this latter thought and the limitations in mind, this section explores the application of models from theoretical evolutionary biology to the domain of organisations, particularly outsourcing.

Analogy of Evolutionary Mechanisms

This application of theoretical evolutionary biological models based on the analogy only becomes possible when sufficient similarities exist (Dekkers, 2008, pp. 50–51):

- Selection acts on mutations of entities. Biological evolution generates a variety of phenotypes and the environment selects beneficial phenotypes. Such a process exists also for organisations where the selection process finds itself in the competition for the customer base, the acquisition of resources and the changes in the ecological system.
- Organisations and organisms are both structurally closed. Organisations constitute allopoietic systems (Dekkers, 2005, p. 148; Minger, 1989) and organisms autopoietic systems (Maturana and Varela, 1980).

- Organisations have the possibility of self-cognition and learning, also found in organisms: the 6th and 7th level of Boulding (1956); see Figure 1. Latent changes are present in the structure of the entity and the environment may induce these changes. Learning becomes possible because both organisations and organisms will deploy a set of sensors to acquire information about their behaviour (e.g. de Geus, 1999; Senge, 1992), although self-reference limits detecting changes and perturbations.
- Developmental pathways exist for both organisations (Teece et al., 1997, pp. 522–523) and organisms (e.g. Maynard Smith et al., 1985, pp. 265–266). Organisms can increase their fitness by undertaking an adaptive walk in a fitness landscape (Kauffman, 1993, pp. 36–67), in which selection acts on beneficial phenotypes; Geritz et al.’s (1997, p. 2027) referral to many models as being only one-dimensional and encapsulating an equilibrium population density means Kauffman’s (1993, pp. 36–67) fitness landscapes should be considered limited in this respect.

Nevertheless, also some differences can be found, thus calling for caution when applying models from evolutionary biology to the domain of organisations (Dekkers, 2008, p. 51):

- Organisations viewed as allopoietic systems do not have the possibility for self-reproduction by recombination in contrast to living entities. For living entities reproduction through recombination has very positive effects on finding fitness peaks in the adaptive landscapes as demonstrated through the NK-model (Kauffman, 1993, pp. 40–54). Thus, the unabridged deployment of genetics to the domain of organisations carries the danger that the study might end up as a metaphor rather than an analogy.
- Organisations have the capability for foresight (Figure 1). The evolution of organisms depends on the creation of mutations and selection of these by the environment. For organisations, it becomes possible to generate perceived beneficial mutations and to influence the behaviour of other organisms, thus incorporating foresight.
- Organisations have fuzzy boundaries. In contrast to organisms, organisations have the capability to shift boundaries (for example, through mergers or outsourcing).

Conceptual models derived from biological models for adaptation can be used for organisations based on the noted similarities, while accounting for these differences.

More specifically, organisations can be considered allopoietic systems in an evolutionary sense, subject to selectional forces (a thought supported by van den Bergh (2003, p. 3)). Developments in evolutionary biology allow an integral approach to the evolutionary process, connecting the generation of variation to selectional forces (e.g. fitness landscapes (Kauffman, 1993) and adaptive dynamics (Geritz et al., 1997)). This means that the predictive power of these models can be extended to the field of management science, accounting for the similarities and differences between organisms and organisations. To this purpose, a reference model describes the interaction between organisation and environment (see Figure 2), consisting of two intertwined cycles: the generation of variation and the selection by the environment. Note that this reference model differs from the popular but simplified evolutionary model by Campbell (1969), which only distinguishes variation, selection and retention; this should be rendered incomplete, even though it used regularly in business and management studies (for example, McCarthy,

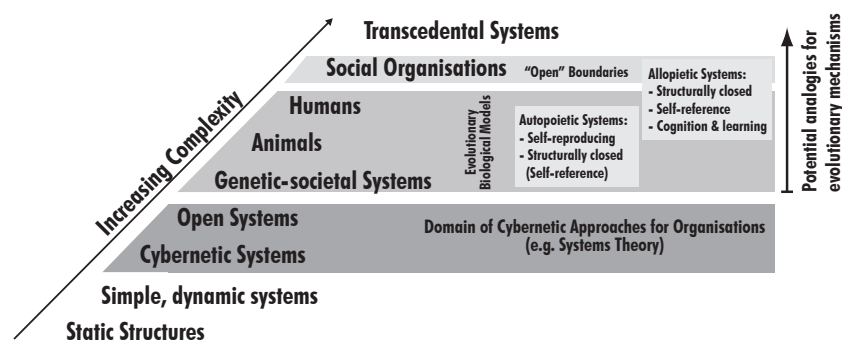


Figure 1: Organisations as allopoietic systems in the systems hierarchy of Boulding.

2003, pp. 738–739; Zollo and Winter, 2002, p. 343). Thus, organisations as allopoietic systems undertake adaptive walks in fitness landscapes subject to selectional forces.

The question is what is the equivalent of genes (and alleles) as building block for evolutionary models in the case of organisations. One possible view concentrates on the division of an organisation in departments, groups, individuals, etc.; Morgan (1997) did propose such when introducing the image of an organisation as an organism. Another perspective would be looking at organisations as a collection of resources with skills and knowledge, expressing itself in the form of capabilities (these manifest in function trajectories); such does Nakane (1986). This perspective aligns with the notion of dynamic capabilities (Teece et al., 1997). A third angle is considering the replication of organisational routines, seen as recurrent processes and practices (Nelson and Winter, 1982, p. 11). This means that mutations in the form of changes in hierarchical structure, processes and capabilities are subjected to selectional forces. According to Figure 2 the notable difference between organisms and organisations is the presence of foresight; whereas organisms principally propagate through random mutation, organisations have the capability to generate perceived beneficial mutations and to influence the behaviour of other organisms. So, mutations in hierarchical structures, processes and capabilities of organisations are in principle teleological, and subjected to selectional forces.

Outsourcing as Mutation

Returning to what outsourcing means as teleological change for companies, this is often acknowledged as changing the boundary. In the context of strategic outsourcing, some works (Espino-Rodríguez and Padrón-Robaina, 2006, p. 50; McIvor, 2009, p. 45) refer to shifting the boundary of the firm. Mahnke (2001, p. 355) calls it the vertical boundary choice. In the spirit of the previous subsection, outsourcing concerns hierarchical structures (e.g. Barthélemy and Geyer, 2005; Cooke et al., 2005), recurrent processes (i.e. organisational routines) (Espino-Rodríguez and Rodríguez-Díaz, 2008, p. 330; Spithoven and Teirlinck, 2015; Wilson and Zhang, 2002, p. 52; Windrum et al., 2008) and capabilities (Espino-Rodríguez and Rodríguez-Díaz, 2008, p. 37; Espino-Rodríguez and Gil-Padilla, 2005; Spithoven and Teirlinck, 2015; Wilson and Zhang, 2002, p. 52); all three equivalents for genes and alleles are present, but none of these refer to evolutionary mechanisms beyond Nelson and Winter (1982). Some works (e.g. Espino-Rodríguez and Rodríguez-Díaz, 2008; Spithoven and Teirlinck; Wilson and Zhang, 2002) blend organisational routines and capabilities without providing a rationale for this specific conceptualisation from an evolutionary perspective. Furthermore, organisational routines and capabilities have been linked to learning in the context of outsourcing (e.g. Windrum et al., 2008, pp. 216–217; Verwaal et al., 2008]); note that this is called self-reference in the evolutionary sense. The mentioned works confirm that outsourcing firm can be viewed as a mutation – a change in hierarchical structures, capabilities and recurrent processes; none of these works relates outsourcing to the context of (theoretical) biological evolutionary models.

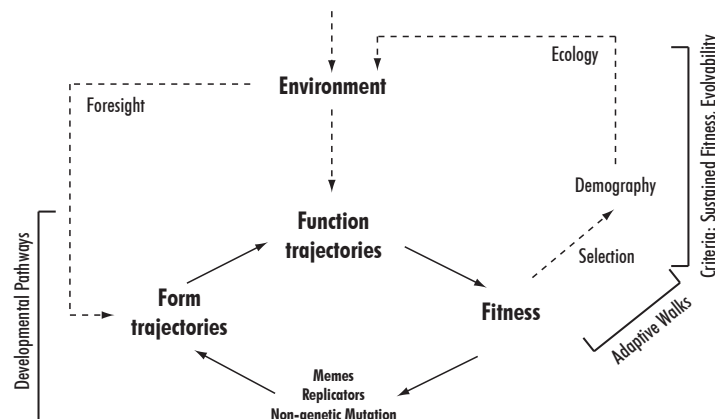


Figure 2: Evolutionary Mechanisms for Organisations Based on Biological Concepts.

This also means that outsourcing as mutation is subject to developmental pathways for increasing fitness and to evolutionary forces caused by population dynamics and ecological changes, according to the evolutionary mechanisms for organisations in Figure 2. It should be mentioned that few studies exist that consider pathways. For example, Broedner et al. (2009, p. 130) refer to path dependency but only investigate the impact of productivity (perhaps a partial interpretation of fitness). And Mirani (2006) proposes three stages in the development of buyer-vendor relationships and applies these to a case study; however, this study does not draw on any evolutionary theory. In addition to developmental pathways as evolutionary mechanism, works (Billi et al., 2004; Güth and Kliemt, 1998) that draw on populations dynamics (particularly, the writings by Hannan and Freeman 1977; 1984) use limitedly evolutionary models that are available. Some (e.g. Shortell, 1997) support the notion and the suitability of population ecology, but again do provide little detail. This all means that the potential of evolutionary mechanisms, such as developmental pathways and population ecology, has been tapped into, but not exploited in terms of using (formal) models derived from (theoretical) evolutionary biology.

Implications for Evaluating Outsourcing Decisions

When outsourcing is considered a mutation of an allopoietic system (i.e. a firm) by shifting its boundary, then the so-called boundary zones must be shifting, too. In systems theories, these zones Miller and Rice (1967) imply discontinuities for a set of resources that are controlled by mechanisms. These mechanisms can be found in the steady-state model (Dekkers, 2017, Ch. 7); see Figure 3. Because of the shifting of the boundary, the set of resources for the processes in a firm is divided in a new internal set and a new external set. Consequently, this impacts the exchange relationships and the collaboration in a supply network; see Dekkers and Kühnle (2012, p.1095) for the collaboration model for the value chain (Figure 4). In an evolutionary perspective, the changes in the boundary firm are part of developmental pathways and learning processes (firms as allopoietic systems), the latter in the spirit of Mahnke's (2001, p. 373) proposition.

What the reference model adds to Mahnke's (2001) view is that outsourcing should be considered a mutation, related to foresight and strategic intents, subject to selection. Traditionally, this is equated to competitive (and corporate) strategies (e.g. Espino-Rodríguez and Padrón-Robaina, 2006; McIvor, 2009). The question is then whether outsourcing as a teleological mutation related to strategic intents contributes to fitness. Note that in evolutionary biology fitness is a central concept, but not defined in terms of variables. Often fitness for decisions on outsourcing is equated to enhancing manufacturing capabilities (e.g. Dabhikar and Bengtsson, 2008). The manufacturing capabilities could be considered a reflection of fitness, but also other facets could be taken into account. However, that manufacturing capabilities and other factors are not always adequately evaluated by companies when making the outsourcing decision is manifest in the work of Kinkel et al. (2008) about backsourcing and the study of Broedner et al. (2009) on productivity effects of outsourcing; their studies among others (e.g. Dekkers, 2011) point out that decisions have not considered all relevant aspects of decisions, which lead later to 'regrets' or to backsourcing. Thus, the results of some studies indicates that fitness of organisations as a result of decision making on outsourcing needs to be considered from an integral perspective, but this may need further definition.

Because, the step for outsourcing by a single firm affects its individual fitness, the competitive fitness landscape changes, too. This dynamic view about population ecology lacks in current studies. In this perspective, the concept of dynamic capabilities is directed at the pathway of individual firms rather than how the competitive positions of individual firms are changing relative to each other as consecutive actions and interventions. In the case of outsourcing, the changed fitness of individual firms influences how others compete. A successful strategy can be mimicked by other firms (mimetic isomorphism (Shortell, 1997, p. 29)) and this could lead to fixing (for example, by following the principles of adaptive dynamics for [in]stability in a population); in such a case, one

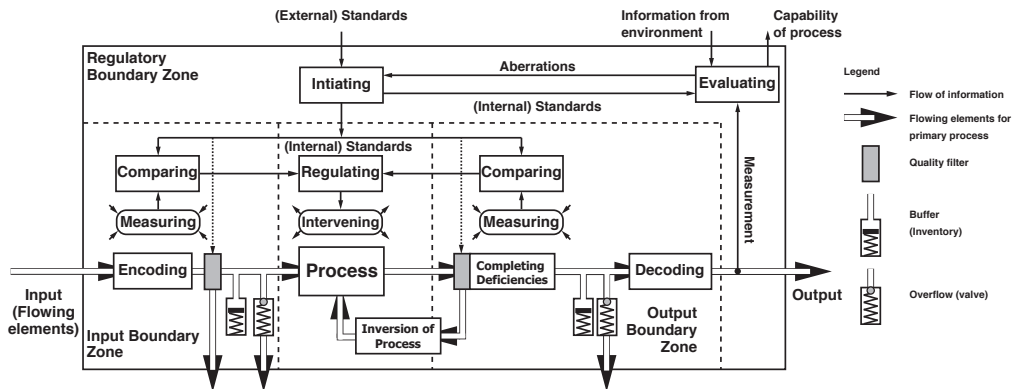


Figure 3: Steady-State Model for Boundary Zones and Related Control Mechanisms.

company in a sector outsources some activities, this is perceived as beneficial, and other companies in this sector follow suit. The only study to take this into account is Loh and Venkatraman (1992), albeit that they do not study underlying mechanisms. Or outsourcing could provoke other responses by firms to seek alternative markets or sectors, to pursue alternative technologies, etc. in order to avoid tit-for-tat. Thus, the improved fitness of a firm through outsourcing activities should be considered not only from a cross-sectional view, but also from a longitudinal perspective. Current longitudinal studies on outsourcing are directed at a single company (e.g. Ciravegna and Maielli, 2011; Fisher et al., 2008; Willcocks et al., 1999), are considering a specific aspect, such as risk (Willcocks et al., 1999) and organisational learning (Ciravegna and Maielli, 2011; Fisher et al., 2008), but do not contemplate population dynamics, except for competitive pressures on cost (Ciravegna and Maielli, 2011; Fisher et al., 2008, pp. 168, 171). This means that evolutionary (stable) strategies and criteria for stability, as commonly found in theoretical evolutionary models (Geritz et al., 1997; Meszéna et al., 2001), have not been incorporated in models to explain outsourcing in a population of firms.

Extending Existing Research on Outsourcing

The preceding deliberations means that from an evolutionary perspective outsourcing should be viewed as a purposeful mutation, which means (a) the inclusion of foresight and learning into the decision-making process, (b) the impact of changes in the boundary zone including exchange relationships on fitness of individual firms, (c) the contribution of outsourcing to fitness of firms, and (d) the impact on population ecology and related dynamics (incl. mimicking and coercive isomorphism); these four mechanisms for looking at the outsourcing decisions by firms from an evolutionary perspective provide a substantial extension of existing research. In terms of Zahra and Newey (2009, pp. 1069–1070), this proposition for the inclusion of evolutionary aspects based on the analogy with evolutionary biology potentially transforms the core of theories for outsourcing. Whereas

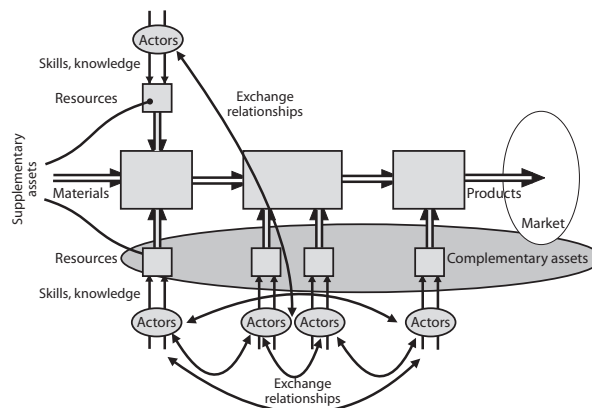


Figure 4: Collaborative Model for the Value Chain.

one of the four mechanisms (boundary control and exchange relationships) is present in current literature but not fully investigated and another weakly (fitness), particularly the impact of outsourcing decisions on population ecology in industrial sectors or economies has not been considered. This also means that outsourcing has been insufficiently set off against the criteria for evolution; both the stability criteria of adaptive dynamics (Geritz et al., 1997) and the criteria for sustained fitness and evolvability encapsulated by Kaufmann's (1993) fitness landscapes could serve as starting point. Thus, this evolutionary perspective presents an integral view by considering short-term and long-run effects.

However, with regard to these effects it should be noted that outsourcing could hardly result in bifurcation. Bifurcation applied to firms would mean a shift to a new business model or tapping into new markets; this means that outsourcing is probably at best an evolutionary stable strategy (Meszéna et al., 2001, pp. 200–201). This assertion can only be established by research looking into population ecology related to outsourcing decisions in industrial sectors. Simulation models using semi-empirical data could also establish such. This strand of research would corroborate existing studies on whether outsourcing constitutes a beneficial or detrimental mutation and under which conditions.

Particularly of interest in this integral view is not only the decision, but also the temporal dimension. For the outsourcing decision, it is the impact that the mutation will have; this is related to the capability of foresight. And for the evolutionary perspective, the longitudinal view should be considered: how the outsourcing by firms influences the dynamics in a specific population of firms on the long term; this calls for game theories, such as adaptive dynamics (Geritz et al., 1997; Meszéna et al., 2001), to be integrated into decision making. But it also extends to how the capabilities of an individual firm evolve to increase its sustained fitness and whether it pursues viable evolutionary strategies. Thus, the temporal dimension is reflected in the development of fitness of the individual firm, the population ecology and the resilience of a population of firms.

Discussion of Implications

Based on an analogy, this paper presents a reference model to describe evolution of companies for the application to decisions on outsourcing. By integrating concepts of fitness landscapes and adaptive dynamics into intertwined cycles of the generation of variation and selection by the environment it extends beyond Campbell (1969).

Limitations of Evolutionary Models for Outsourcing

The analogy has four major limitations. The first is that organisations should be considered allopoietic systems, whereas organisms are autopoietic systems; some studies (e.g. Alaa, 2009) in the context of outsourcing see organisations as autopoietic systems. Even those (e.g. van der Linden, 2011, p. 1196) that refer to organisations in the context of outsourcing seem to discard that they should be classified as allopoietic systems. The subtle difference implies that not all evolutionary mechanisms from (theoretical) evolutionary biology may apply. However, in this propositional paper only relevant evolutionary mechanisms to allopoietic systems have been considered. Second, the focus in the deliberation has been on firms that are focusing a single product-market combination. In reality, some firms may be part of a conglomerate and, therefore, mutations may be subject to corporate strategy and not just to competitive strategies (which would aim at increasing fitness in a specific product-market combination, the population). This impact of this limitation is more difficultly to be addressed by evolutionary models; Chen et al. (2011) consider industry dynamics in this fashion, but not by inclusion of evolutionary processes. Third, the term fitness, which is already difficult to assess in evolutionary biology, is seen as valid for the domain of organisations, too. In the case of outsourcing, fitness should at least describe manufacturing capabilities and product differentiation. This means that fitness is not mono-dimensional, for example, as in the complex adaptive systems described by Kaufmann (1993, pp. 39–67), but should be represented in models with multi-dimensional fitness, as found in adaptive dynamics (Meszéna et al., 2001). Fourth, decision making is

seen as rational and based on foresight; in practice this is not necessarily the case, although Güth and Kliemt (1998) make the case that even subjective preferences are subject to processes for adaptation. Except for the second one, the limitations seem to have minimal impact on the proposition that models derived from (theoretical) evolutionary biology may provide insight beyond those based on canonical theoretical perspectives for outsourcing.

Potential Implications for Managerial Practice

Consequently, the thoughts here have a profound impact on the way a decision on outsourcing should be made. Not only should the decision consider performance objectives, it should also look at impact of the change of the boundary on the population and long-term effects. Some points have been noted in preceding research, but they have not been articulated and put into an integral perspective. Thus, the evolutionary perspective may also be helpful for actual decision making, though it needs to be formalised into methods akin van Aken and Romme's (2009) thoughts on management science as a design science.

The thoughts here should lead managers not only considering immediate effects of outsourcing, particularly, costs, but also how their decision will affect the competitive landscape. If one company decides to outsource, others might follow and potentially wipe out the competitive advantage. Then, benefits are not achieved as originally envisioned for the firm and further interventions may follow, which could include outsourcing of more activities to reduce cost. These decisions are multi-dimensional, meaning comprising of multiple performance measures and not cost alone; the overreliance on cost is also found in Dekkers et al. (2017). Evolutionary models add a view that integrates better evolutionary strategies by other firms and impact on population dynamics.

Agenda for Research

To achieve better insight into the long-term effects of outsourcing, the points raised in this paper should be translated into models that can explain and predict decision making by firms on outsourcing. This is based on the premise that evolutionary game theory will include long-term effects, see Vincent and Vincent (2000, p. 22). For the domain of outsourcing, this paradox between optimisation and evolutionary strategies has been noted implicitly by several studies, including Dekkers (2011) and Kinkel et al. (2008). When it is possible to model evolutionary strategies for outsourcing, ultimately, these models could serve also as basis for methods to support decision making on outsourcing. However, this requires the evolutionary mechanisms for outsourcing to be integrated by:

- Mathematical models describing evolutionary strategies and population dynamics derived from adaptive dynamics (Geritz et al., 1997; Meszéna et al., 2001). These models should cover effects of mimicking, coercive isomorphism and responses by firms, such as tit-for-tat. However, models used in theoretical evolutionary biology cannot directly be applied to management science and economics. This is caused by the population size in industries being different from those in biological systems. In addition, the models for adaptive dynamics are based on Malthusian growth models. These models do not necessarily apply to firms, but could be related to the products or services. This may mean that there are two related populations: the market domain as a population subject to the Malthusian growth model and the firms competing in a market as population. Perhaps, the models of adaptive dynamics need to be complemented by models based on the Stackelberg game to make this possible; whereas this link is implicitly mentioned in works (e.g. Vincent and Vincent, 2000), it has not yet been connected in modelling. Consequently, whereas the potential of applying models derived from adaptive dynamics seem beneficial, developing actual models will require overcoming some fundamental challenges in mathematical modelling.
- Modelling of manufacturing capabilities in terms of a fitness space. The expression of fitness should be related to the competitive position of a firm in a specific market domain. It implies that the fitness should be multi-dimensional, because competition between firms is through offerings of products and services, performance criteria,

etc. Within the domain of manufacturing the competitive position is denoted through the concept of manufacturing capabilities. Some advocate the trade-off model (e.g. Da Silveira and Slack, 2001; Ferdows and de Meyer, 1990) and others see it as a cumulative process (Größler and Grübner, 2006; White, 1996). By analysing results from the evolutionary models proposed here for outsourcing, it may become apparent which one of these two approaches to manufacturing capabilities holds more validity.

- Integration of the intertwined cycles of generation of mutations through outsourcing and selectional processes. Whereas the suitability of adaptive dynamics and matrix games (e.g. Geritz et al., 1997; Meszéna et al., 2001) – using a multi-dimensional space for fitness and describing population dynamics – justifies using these models for theoretical evolutionary models to describe the effects of outsourcing, these do not describe alleles. The NK-model of Kauffman (1993, p. 42) uses genetic mutations, but does not incorporate a multi-dimensional space for fitness and the modelling of population dynamics. Therefore, one challenge is how adaptive dynamics and matrix games can be better combined with descriptions of alleles with regard to outsourcing.
- In addition to such methods offering a more complete picture informing the outsourcing decision, these methods should be compared with other methods and theories; this is commensurate with Dekkers et al.'s (2017) notion that such studies are lacking.

Concluding Remarks

Whereas there is evidence that the view of academics on outsourcing has been subject to progressive insight, the incorporation of models from (theoretical) evolutionary biology has lagged; this is a missed opportunity since no equivalent in management science exists of theory-based ecology (e.g. Pásztor et al., 2016). This paper has presented a way forward based on this very different perspective; moreover, the framework and the related reference model potentially address some setbacks of outsourcing noted in the literature.

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