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Prestige of the Decision Ecology and Risk-taking in R&D Project in the Biopharmaceutical Sector

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Abstract

Knowledge-based organizations pose an innovation project 'scope–risk paradox' in their innovation projects. On the one hand, the uncertainty of the broader scope avails them opportunities to delegate responsibilities to the environment; on the other hand, an elevated risk–reward evaluation hampers their aspirations. This article suggests a solution: the prestige of the decision ecology inflates rewards and deflates risks in the scope decision. This decision ecology of the research and development (R&D) project consists of five prestige factors: (a) technological, (b) organization-specific, (c) nationality, (d) temporality and (f) structural. High prestige of these contextual elements implies that they influence the perceived reward to risk ratio. High prestige predicts high risk-taking, leading to a broader scope of the innovation project. The evidence supports that the technological prestige, organizational prestige, temporal prestige and structural prestige contribute to the broader scope decision of the R&D project in the clinical trial. However, the project nationality shows no difference. Overall, we conclude that the interpretative decisions based on the situation prestige influence the R&D project in the biopharmaceutical sector; therefore, the prestige of these ecological factors should matter in other disciplines. Other disciplines that draw value from the social context will show more pronounced effects of the prestige on decisions. Hence, this study sets a foundation for the theory and practice in other projects, organizations, sectors and nations.

Keywords

Prestige of the project, decision ecology, perceived risk-reward ratio, clinical trials, the biopharmaceutical sector, university-sponsored project scope

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Introduction

The organizational propensity to engage in a broader scope of its research and development (R&D) project poses a dilemma in the risk–reward-based decision-making. On the one hand, broader scope of the R&D project offers opportunities for new products, improving comparative position of the organization for its growth. The perceived opportunities influence the organizational decision for the risk-taking setting in the project scope. On the other hand, the perceived uncertainty of the project constrains the actor's value perception and the situated project scope. The contraints of the environment keep the R&D activities closer to the existing scope of the project or organization (March, 1991). Because of these perceived risks in the broader scope, the organization prefers a narrow scope of its R&D project in favour of familiar activities of low risk–low rewards (Teece et al., 1997; Winter, 2003). Therefore, the organizational desire to innovate predicts a broader scope for a comparative advantage, and the external risk of the environment predicts a narrower scope of the R&D project (March, 1999). This risk–reward situation leaves organizations and scholars in a dilemma.

The extant literature offers various solutions to the dilemma in the decision process for the organizational project scope setting. One view posits that risk-taking behaviour follows from the learnt behaviour, and the decision-maker's learning about the risk influences the scope decision (Christensen, 1997; O'Reilly & Tushman, 2008). In learning behaviour, history evaluates risk–reward situation and influences the decision. Organizations that share history and the project decision ecology interpret the situation and action in a similar fashion as compared to those that differ (Birnbaum, 1984). Unshared history and decision ecology predict multiple interpretations and technological scope decision (Henderson, 1901). For instance, some firms rely on one product business (Klepper, 1996); others rely on multi-product businesses (Chandler, 1994). However, at an R&D project level in high-technology sectors, a narrow scope increases efficiencies and performance as compared to a broader scope. Huckman and Zinner (2008) show a positive correlation between the project scope and efficiencies in the clinical trials in the biopharmaceutical sector. It suggests that project contingencies and coordination activities influence the scope decision.

These solutions leave some voids in the discourse. First, history emphasizes the past without its interaction with the situation. Second, efficiency view emphasizes the outcome-driven decisions. The consequential decision leaves the social context on the side of the solution. Both views lack explicit attention to the decision context, which we refer to as decision ecology. The decision ecology alludes to the situation that interpretively defines the decision-maker's identity for rationalized decisions in that situation (March, 1999; Weick, 1995). For instance, the R&D project's technical contingency, sponsor, location, timing and structural dimensions form the decision ecology. However, the multidimensional has any number of attributes, respective identities and project scope decisions. For the current purpose, we delimit the decision ecology of the project prestige that draws on the social status theory, leading to the prestige power of the decision-maker (Podolny, 1993; Podolny & Stuart, 1995; Saunders et al., 2012). The prestige power influences the risk–reward evaluation and decision of the project scope (Pfeffer & Salancik, 1978; Williamson, 1963). Thus, we propose that the prestige of the decision ecology factors will predict the project scope because the prestige power inflates expected rewards and deflates the risk of the project.

To support this position that the ecology of the decision will predict a broader scope of the R&D project, we turn to the university-sponsored clinical trial project. In fact, the university-sponsored clinical trial project refers to a project with a major sponsorship contribution from the academia, namely universities that oversee, pay and ultimately collect and analyse data from the clinical trials. For this reason, industrial organizations and key stakeholders from the industry that do not hold the

status of academic institutions or universities that in the meanwhile legally act and are involved in the sponsorship of the clinical trial projects are explicitly excluded from the observation in this study. A clinical trial project has scientific properties, standardized methods and rigorous regulatory procedures for the merits of the project. These internal and external characteristics of the clinical trial technology would suggest that the scope and risk-taking would be insensitive to the contextual social standing. The scope decision of the clinical trial will ignore the ecological prestige of the project in favour of a broader scope. Instead, the university-sponsored clinical trials show that the project ecology and its prestige matter because the decision-maker interprets the risk–reward value in this context, and the prestigious context inflates rewards and deflates risks. In other words, whenever the prestige of a decision context increases, the project sponsor tends to increase the scope of the project. Since this holds in the biopharmaceutical sector, we contend that the prestige of the decision ecology will hold in other sectors.

Literature Review and Gap

From the late 1970s, the innovation management literature dealt primarily with the annexation among business, industrial engineering, operations research and management science (Lopes et al., 2012). Despite the evolution of innovation management interface, industry and organizations adopted severe and variety of innovation approaches rather than one particular mainstream innovation approach. In this case, large organizations do not consider mainstream innovation approach to be successful, whereas contextual innovation, including contextual decisions, tends to serve as a more advanced, promising and profitable strategy (Arunachalam et al., 2018; Ortt & van der Duin, 2008).

For this reason, certain internal and external factors have critical and direct influence on the adoption of innovation policies, practices and projects within the organizations across multiple economic sectors. In fact, when invention or idea is being adopted on a market from a lab successfully, the process is declared as innovation. However, once the innovation becomes so successful that it eventually changes the standard practices and, therefore, forces essential market leaders to shut operations, it becomes what experts express as disruptive innovation (DI) (Rao et al., 2019b). Although the biopharmaceutical sector is different from the conventional businesses, the process of integrating innovations poses a high-risk to lead the disruptions and conducts decisions, while the process may give rise to so-called *innovator's dilemma* whether the response towards DI is rational or absurd (Henderson, 2006; O'Reilly & Tushman, 2021; Rao et al., 2019a). In particular, the implication on the biopharmaceutical sector poses a risk involved in R&D stage of the drugs, which eventually intervene in the scope and scale of the development of the drugs (Henderson & Cockburn, 1996).

Moreover, the effect of focus on operational performance appears to increase the organizational profitability, total productivity and quality, which eventually reflect on the prestige of decision ecology and risk-taking. In the past decades, the significant and guiding principle was to dedicate vigilance to the small set of interconnected tasks to improve operational performance. As a matter of fact, multiple studies highlight that performance of particular business unit, department or even the whole firm is enhanced to the degree that operational entity sustains focus on the narrowed scale of activities (Aremu et al., 2021; Banik & Chatterjee, 2021; Huckman & Zinner, 2008; Kaydos, 2020; Samson & Terziovski, 1999).

The significant theories with a focus on organizations and their environments, the essence of external control of organizations and the impact on the decision ecology and risk-taking that they represent are as follows: (a) resource dependence theory (RDT), (b) population ecology and (c) institutional theory (Hannan & Freeman, 1977; Hillman et al., 2009; Meyer & Rowan, 1977).

First, the RDT examines how external resources within the operational environment of an organization affect its behaviour. The guideline principle and core concept of theory rely on the principle that the organization (e.g., business enterprise) must engage in transactions with the vast stakeholders and actors within the operational environment (e.g., industry) in order to acquire human, financial, intellectual, and physical resources (Hillman et al., 2009; Pfeffer & Salancik, 2003). In this study, the prestige factor of temporality of decision ecology intervenes towards RDT.

Second, the social ecology, similar to RDT, concentrates on the effects of operational environment on the organization, whereas the social ecology theory relates to the materialistic aspect of the environment. In particular, the population density is a variable that determines the intensity of competition—emulation for resources of social ecology. Beyond that, population ecology is predominantly silent about causes and grounds of the organization's internal dynamics (Pfeffer & Salancik, 2003). In this case, the social ecology theory intervenes towards technological prestige factor of the decision ecology.

Third, the institutional theory, sometimes also referred to as *neoinstitutional* theory deeply and more resiliently focuses on the perspectives of the social structure in the operational environment of organizations. Having said that, institutional theory observes and studies how management practices of organizations' structures, norms and rules tackle social rather than economic pressures within the operational environment (Meyer & Rowan, 1977). In other words, the institutional theory reflects on organization-specific prestige factor of the decision ecology.

Based on the recent research of Gardas et al. (2021), authors argue that the process of decision-making within the health sector, namely in surgical management, has notably a low degree of transparency. Therefore, efficient and transparent decision-making within the biopharmaceutical industry plays a crucial role as a part of the health sector. In fact, few previous healthcare management studies introduced a variety of factors with an impact on the decision ecology; however, none of them have studied the particular relationship among the factors that influence risk-taking in the context of decision ecology.

When it comes to multiple-criteria decision analysis, as such, prestige factors in the R&D projects and beyond should be observed in one specific approach, and that is rating. The opposite approach, that is, the sorting of prestige factors, may cause confusion, and systematic evidence proves that sorting of factors is very often used as an equivalent to the rating approach in the multi-criteria decision analysis. Hence, this study examines ecological elements based on measures that are ranked in order, ordinal, count and phase scales in order to avoid inappropriate scientific and linguistic expression as well as manipulation of the empirical results (Colorni & Tsoukiàs, 2021).

Moreover, in the phase of risk-taking and decision-making within the biopharmaceutical sector, there are certain tools that can lead knowledge-based organizations to increased efficiency in decision-making. One of them is Pareto navigation, which is an interactive and influential tool that has been applied across multiple organizations to resolve continual decision issues. The potential of the Pareto in the context of biopharmacy relies on decision variables consisting of the chemical development and design process, as well as the manufacture of drugs. In spite of the complexity, the decision variables may consist of continual and binary variables to help resolve risk-taking problems in the development stages. For this reason, R&D projects within the biopharmaceutical industry can integrate the tool to navigate the decision-making through the 'scope–risk paradox' (Collicott et al., 2021).

To summarize, in addition to the most-relevant theories, there are more research, economic and social science theories that empower the ideology of this study, namely the prestige of decision ecology and risk-taking in the R&D projects in the biopharmaceutical sector. Although a lot of the previous research, empirical assessments and literature focused on the relationship between organizational decision and social ecology, it is noteworthy to find that previous empirical exploration has had evident gaps in the

examination of the relationship between decision ecology and risk-taking in the R&D projects (Jacobs, 1974; Streatfield, 2003; Vaughan, 1998). Therefore, this article addresses the empirical gap of scale and scope of drug development, decision ecology and risk-taking within the R&D divisions of the biopharmaceutical sector at the clinical trial with the help of evidence that highlights the technological prestige, organizational prestige, temporal prestige and structural prestige, which contribute to the broader scope decision of the R&D project in the clinical trial.

In conclusion, the topic of risk-taking and decision ecology as a part of the sustainable development concept received notable attention from the private, public, academic and non-profit organizations. Due to a substantial pressure to conduct research, policies and business more ethically (Weaver et al., 1999) and the significance of decision ecology and risk-taking in the field of research and development, a variety of key stakeholders undertook necessary measures to increase knowledge of the decision ecology and risk management (Degeorge et al., 2004; Figueredo & Jacobs, 2010). In fact, these topics are very often covered within the curriculum of universities, educational institutions and development programmes for experts in the research industry (Luke, 1999; McMillin & Dyball, 2009). As of today, decision ecology associated with risk dominated the research agenda, receiving greater attention, while decision ecology associated with prestige received lesser attention (see Table 1). Thus, this article aims to suitably fulfil the contemporary research gap and systematic lack of previous research that broadly focuses on decision ecology and prestige. Altogether, this research study aims to narrow down the criteria of decision ecology by associating the research with prestige factors underlying in the variety of concept levels.

Theoretical Framework

To formulate the framework, we integrate the contextual prestige to the discretionary power of the decision-maker, the discretionary power to the shifting identity of the decision-maker and the identity in that situation to the risk–reward evaluation for the R&D project scope decision. In so doing, we advance the proposition that a decision context has prestige effects on the decision-maker. The decision-maker draws discretionary powers from the project prestige, and the prestige-driven discretion leads to the evaluation biases—inflated risk and deflated rewards. Hence, we suggest that high prestige of the context will predict a broader scope of the innovation project in the clinical trial activity in the biopharmaceutical sector.

The notion of prestige and power comes from the status characteristics theory, which states that the status of some characteristics produces prestige and power behaviour (Berger et al., 1977, 2014). The status of those characteristics has direct relevance to the functional tasks and indirect relevance to the interaction paths (Berger et al., 1976). In the context of status theory, authors of this study argue that,

Table 1. Searches for 'Risk' and 'Prestige' in the Context of Decision Ecology (20 November 2021).

	Search string (1): 'Decision Ecology AND Prestige' in title, abstract or keywords 2006–2021	Search string (2): 'Decision Ecology AND Risk' in title, abstract or keywords 2006–2021
Google Scholar	1	13
Scopus	12	1.675

Source: The authors.

status has indirect paths and effects on the decision and action, whereas, when contextual status has a level of prestige and power that is drawn by decision-maker in the ecology situation. Therefore, the interpretative decision explains the variation in the project scope. Hence, this proposition makes a case for the interpretative decision of identity and its power.

The social identity theory bridges the prestige and interpretation link in subtle ways. It posits that actors enact their decision environment based on their changing identities (March, 1999; Weick, 1995). The contextualized identity shifts in two ways. The identity changes when one type of context replaces the other type, and it reflects a dimension of the context. The other change in identity occurs when the prestige of the context changes on the hierarchical scale. It would imply that a combination of the two types shifts the decision-maker's identity. If a high prestige on the ecological scale leads to a high discretion of the decision-maker and low prestige on the scale leads to a low discretion, then the context-based identity on the scale shapes the discretion for the decision.

The organizational contextualized prestige of the decision reflects on the discretionary power and overvalued risk of the R&D project scope. The role of contextual prestige has special relevance to risk evaluation and scope decision in a highly uncertain technology. The biopharmaceutical industry has the highest risk associated with its activities, and even more so, the clinical trial project has highly uncertain attributes. Extremely high cost, lengthy activities, low probabilities of success and stringent regulatory approvals suggest that contextual prestige and discretion have some role to play in the decision for the scope. If so, then a high discretion level, resulting from the prestige effects of the contextual factors, inflates organizational positive information process and suppresses negative information process (Forgas, 2000; Forgas & Laham, 2009). It follows that the decision ecology of prestige and power leads to overestimating rewards and underestimating risk in selecting the scope of the clinical trial project.

The concept of decision ecology differs across disciplines, and despite its variety of denotations, these concepts converge on the connotation of the context, prestige and effects on risk decisions. Organizational scholars call it the ecology of the decision (March, 1999). Critical rhetoricians refer this to the ecology of the decision motives and actions (Bitzer, 1968; Burke, 1966). Management literature refers it to generic question of innovation project framework (MacMillan & Mcgrath, 1997). Institutional economists refer it to the power questions (Boulding, 1989). The practice and policy literature refers this to the technological situation of the future decisions (Drucker, 2010). The psychology literature calls it the ecology of emotional action (Lazarus & Smith, 1988) and the contextual of affective state. Natural science literature refers it to discovery questions (Annesley, 2010). Therefore, the decision ecology elements questions behind the context-specific prestige and decision converge from multiple disciplines.

The context-specific questions of the decisions that affect organizational discretion are divided into five distinct methodological types (Annesley, 2010; Krippendorff, 2004). Starting with the entrepreneurial universities' context-specific evaluation of risk-taking, we turn to the technology prestige, sponsor's prestige, location prestige, temporal prestige and structural prestige. The answers to these questions follow context-specific identities and decisions of an organization. The context forms the organizational identity, which translates into organizational prestige power and discretion, and it leads to the evaluation of the risk and reward beyond the normal level of risk–reward evaluation. The central argument posits that high prestige ecology, which symbolizes the context of the decision, will lead to the inflated perception of power, discretion and undervalued risks of the project scope.

The decision ecology consists of several components that drive decisions and actions. First, it refers to the functional task in the technological project, and the 'what' questions drive this ecological component. Conventional literature refers it to contingencies (Galbraith, 1973). Second, after the functional information processing decision, the decision ecology shifts to the decision-maker's position. In the case of an organization, the organizational ranking matters, and the 'who' question shapes the

answers for the scope. Third, since every project has a location-specific decision, the prestige of the location deals with the spatial influence. Fourth, a project decision and its ecology have to face the temporal contextual decision. The prestige of the social dimension of time demands elaboration, and the following pages elucidate this component of the decision ecology. Fifth, the structural component of the decision ecology refers to the organization and methods; therefore, it depends on the 'how' question. The perception of these five components of decision ecology for the R&D project scope follows from the social environment—the social status of the ecology of the decision.

The social ecology of the project has prestige in the same way an individual, group, society or nation has prestige (Weber, 1978). For instance, a technology problem-solution has a contextualized prestige (Bijker, 1997). A place or location has a contextualized prestige (Giddens, 1990). Similarly, the temporality of an event has a contextualized prestige (Bourdieu & Coleman, 1991). Furthermore, the organizational structure has a contextualized prestige (Podolny, 1993). If the decision of a project depends on its context, and the ecology has prestige, then the decision-maker's identity, from the ecology prestige, shapes the interpretation of uncertainties and actions for the project scope (Gioia & Thomas, 1996; March, 1999).

The Project Scope

The scope of an innovation project varies with the inclusion of functional activities, methods and outcomes (Skinner, 1974). For instance, the clinical trial project has multiple methods, processes, functions and outcomes (Malik, 2018). The count of these elements correlates with the scope of the project and its merits. A broader scope reveals merits like innovation opportunities and creates new knowledge for the survival and growth of the organization. A broader scope also reveals demerits of excessive cost and uncertainty. On the opposite side of the scope, a narrow scope has merits of efficiencies in purpose and management. Huckman and Zinner (2008) show that clinical trial projects with a narrow scope perform efficiently when compared to broader scopes. Thus, the decision of the scope depends on the interpreted values of the identities of the decision-makers, which come from the context.

A preliminary analysis of carefully selected 20 universities' projects shows inter-university variation, inter-country variation and university–industry variation. Appendix A shows the average scope of the university-sponsored project in the clinical trial activities. The average scope of universities' project reaches 1.7, which means that a project includes about two major industrial targets. Appendix B shows the firm-sponsored project scope in this sector. The average scope of firms' project reaches 1.13, which means that the firm focuses on one major industrial target. If we accept that scope represents a type of risk, then the comparison indicates that the university-sponsored decision-makers take 13% more risk than the industry-sponsored decision-makers. Evidence from other studies, sectors and organizational contexts also point to the variation of the scope of the R&D project or product in the business line (Clark, 1989; Henderson & Cockbrun, 2001; Jensen & Zajac, 2004; Teece, 1980). Thus, the variation in the R&D project scope (risk) has a cross-contextual aspect to it.

The social ecology of the decision suggests that the cross-contextual variation occurs through the interpretation of the situation, meaning and actions. The situation changes when the factor, actor, space, time or events (structure) changes (Giddens, 1990; Keefer et al., 2017; March, 1999). Under the umbrella concept of decision ecology of the project, we explore the prestige of the project technology before moving to the other components of the contextual meaning for the scope decision.

Project Technology Prestige

The *project technology-specific* prestige builds on the assumption that morbidities (diseases) have a social hierarchy, which emits prestige, and it leads organizations to overestimate rewards and underestimate risks through inflated prestige power. Sociology literature has long explained the notion of prestige (Hope, 1982). In early studies, the American Journal of Sociology has published numerous articles on occupation prestige. Following those studies in the Western setting, Chinese scholars confirm the prestige of a list of occupations, and they find strong support for similarities between the West and China (Lin & Xie, 1988). Followed by previous studies, Zhou (2005) further developed an institutional mechanism that links and explains the development and influence of occupational prestige. These arguments show that the occupation prestige has socio-economic roots that affect and reflect the technology and the practitioner's decision.

To support the argument that technology has a prestige that influences decisions of individuals and organizations, the evidence from the medical field shows that doctors and medical practitioners assign a prestige to some diseases more than others (Album & Westin, 2008). Another study shows that US medical practitioners prefer surgeries, the French medical practitioners prefer liver treatment and German medical practitioners prefer cardiac and hypertension treatments (Mechanic, 2002). It implies that, although the intrinsic properties of the disease-targeting technology transcend the prestige of the context, society evaluates the functional and occupational positions of the role on the prestige hierarchy (Nicolaisen, 2009). For instance, the prestige of the law profession differs (Sandefur, 2001), partially due to clienteles and partially due to intrinsic purities of the profession. Professional economists give high prestige to theoretical modelling and low prestige to data collection for empirical support (Shiller, 2013). Likewise, professional prestige differs across disciplines and nations. Since the occupations have prestige in their social context, the R&D project has contextual prestige, which can increase the prestige and discretionary power of the decision-maker with a propensity towards risk-taking behaviour—the broader scope of the R&D activity follows from this discussion.

Hypothesis 1 (H_1): The innovation project technological prestige (morbidity target) will associate with a broader scope of the R&D activity.

Project Organizational Prestige

Just as the project technology emits prestige to the decision-maker, the organizational prestige affects the actor's discretion and overvalued rewards. Organizational prestige refers to the position compared to its peers in the hierarchy of the field (March, 1999, p29), and organizational prestige concepts have a long-established history (Perrow, 1961). Although individual managers make decisions under the prestige effect (D'Aveni, 1990), the current debate rests on the organizational prestige and its decision on the project value under conditions of uncertainty. Following the university-sponsored projects, we use the actor, organization, university and sponsor interchangeably. Our central argument suggests that organizational prestige comes from multiple sources, and it contributes to the perceived power of the decision-maker, which leads to over- or underestimation of risks and rewards of the R&D project in the clinical trial domain.

Regarding the sources of the organizational prestige, the literature suggests that the past organizational performance and its current performance in the field highlight its position as compared to its peers. For instance, the competitors and other actors who directly or indirectly influence organizational decisions

and operations influence its decisions and actions (DiMaggio & Powell, 1983; Scott, 2003). The organizational response to those actors in the field shapes the organizational prestige position. On the one hand, the organization needs to conform to rules; on the other hand, it needs to perform in order to build prestige. For instance, the organizational ranking in the field depicts its prestige, and the prestige shapes organizational interpretation and discretion in favour of a positive value that outweighs the negative value (Shrum & Wuthnow, 1988). In this chain of events, prestige and discretion have several implications in the decision-making process under uncertainty.

First, the prestige power changes the belief and understanding of the situation in the minds of decision-makers, and the risk appears like opportunities (March, 1999). Second, the discretion translates into enabling the power of the decision-maker to deflect the pressure of the stakeholders who avoid risk-taking and prefer a narrow scope of the innovation project. To be able to deflect the short-term-focused stakeholders who prefer efficiencies over risk, the decision-maker of R&D project counteractively engages in enhancing the development and growth of the organization (Pfeffer & Salancik, 1978). Third, the organizational prestige-driven discretion mitigates the threat of the risk in the environment (Boulding, 1989; March, 1999). In other words, the organizational prestige leads to underestimated risk and overestimated rewards from the R&D project scope. Together, the discretion- and prestige-based beliefs induce risk-taking behaviours in favour of a broader scope.

Hypothesis 2 (H_2): The innovation project sponsor's organizational prestige will associate with a broader scope of the R&D activity.

Project Location Prestige

The prestige of the location also predicts the organizational interpretation, discretion and the project scope. A high-prestige location of the project can inflate the value of the R&D project and deflate the risk in the minds of decision-makers. The notion of location has multiple frames and constructs. It refers to a place, space or contextualized organizational event (March, 1999). Partially, it reflects the physical elements of a location. A street, city, region or country refers to the first kind of location. Partially, it refers to the social space such as class, group or nationality. In one literature, sociologists defined, measured and explained the prestige of the nation (Shimbori et al., 1963). The nationality of an organization refers to the second concept of the social space, and it emits prestige to the organization in the decision-making process. Since the nationality of the organization emits prestige, it can influence the evaluated decision of the innovation project scope. In our assumption made here, the national prestige changes on the scale rather than the physical location of the nation (Hodge, 1965), and the nationality of the decision actor captures these variations in the decision context.

The comparative position of the national location for innovation projects between nations varies in its attraction and preference (Friedman, 2010). For instance, science parks represent various levels of the prestige of the location for a knowledge activity (Howells, 1990). The social network in a region alludes to another type of social construction of the space (Powell et al., 2002). Creative people flock to places where they find others like them (Florida, 2008). Silicon Valley in the USA has the prestige of high-technology entrepreneurs. China's prestige is a largest market—it is called the factory of the world. India's prestige is its 'call centres' run by foreign enterprises. Paris and Milan signal their prestige for the sector-specific location in the fashion industry. The prestige of these fashion centres has been developed through the social construction of the historical events. Similarly, Lombard Street in London and Wall Street in New York gained the prestige of being financial centres. Economists (North, 1990), organizational

theorists (Scott, 2003) and sociologists (Bourdieu, 1963) explain how formal and informal institutional mechanisms constitute the prestige of an entity. Therefore, as prestige trickles down to the decision-maker from other contextual factors, the prestige of the nation trickles down to the decision-maker towards the inflated rewards and deflated risks.

Hypothesis 3 (H_3): The innovation project's national prestige will associate with a broader scope of the R&D activity.

Project Temporal Prestige

The prestige of the temporal context influences risky decisions in setting the project scope in the highly uncertain activities in the technology sector. As organization, location and nationality have prestige effects on the decision, temporal context has prestige effects on the R&D scope decision through inflated rewards and deflated risks. However, unlike the prestige concept of the technology, organization or location, the concept of time poses conceptual challenges because of its abstractness. The abstract concept refers to the time–space distanciation (TSD) by Giddens (1990), who explains that the abstract ideas of time and space from each other in a group's or nation's culture imply control over events. Before controlling those events, the abstract framing of the time and space from each other and its ecology allows its altered meanings. For instance, the measurement and application of time for functional purposes and economic goals divide the time into manageable units. Personal wages per hour as an abstract notion of time differs from the contextual time in social space. Recent empirical studies have elaborated on the abstraction of time and space to support the distanciation concept (Keefer et al., 2017), which, according to Gidden, alludes to the perceived distance between the time and space ecology of the decision.

A disintegrated notion of time from its social context alludes to a mechanical dimension of time, and the mechanical dimension of time produces an abstract idea of time. On the abstract–concrete continuum, some decision-makers highly value the abstract notion of time, and others highly value the concrete notion of time on the continuum. Those who feel they control the time often appear on the abstract side of the continuum, and those who feel that time controls them often appear on the concrete side. Between the two groups, the prestige of the time varies on the distance line between abstract idea and specific experience. Certain groups experience a high prestige along the one side; while other groups view prestige along the other side. It follows that the prestige of the decision ecology depends on the abstract or clock time versus the social experience time. The clock time comes embodied in artefacts, commodified in economics, and sequenced in chronical order for commensurable applications. In contrast, the social time lies in the psychological and socio-economic contexts (Giddens, 1990). If the time has different meaning and value for the decision-makers in risk-taking, then the value drawn, based on a high or low evaluation of time, will determine the risk-taking in the project scope.

Like the sociologists' view on the multipolarity of time, natural scientists acknowledge the social dimension of time and its potential for prestige effects on decisions. Professor Stephen Hawking alludes to the prestige of time in his writings:

> …our views on the nature of time have changed over the years. Up to the beginning of this century people believed in an absolute time… However, the discovery that the speed of light appeared the same to every observer, (…we) had to abandon the idea of that there was a unique absolute time. (Hawking, 1988, p. 162)

*S*ocial scientists and philosophers translate the social side of the time (subjective) and the physical side (objective) of time. The subjective view means 'reflecting upon living in time', and the physical view means 'living in time' (Schutz & Luckmann, 1974). Some writers use the duality of time as secular versus divine temporality (Boorstin, 1983; Chakrabarty, 1997). Others go further and suggest that time has biological, physical and social dimensions (Giddens, 1984; Luhmann, 1983). These authors agree on three ecological views of time. The social time or experience versus physical time represents different durations; the time and its distance from experience construe different meanings in the social interaction; the time has prestige in the inter-actor relationships (Mead, 1936; Merton, 1982).

The origin of the prestige of time in economic sociology refers to two theorists of the twentieth century who addressed the social dimension of time. Max Weber explored societies' attitudes to temporality (Weber, 1958), and Pierre Bourdieu addressed the prestige of time—the Algerian peasants' attitude to the past and future (Bourdieu, 1963). Bourdieu argued that traditional Algerians reinforced the past and endured the future, while capitalist Algerians controlled the future. Bourdieu refers this duality to the bureaucratic and entrepreneurial times (Swedberg, 2011). Those who live in bureaucratic times conform to it and seek its protection; those who live in entrepreneurial time attempt to control and exploit it. The literature of then infuses interest in the temporal prestige in the contemporary arguments on interpretative decision ecology in risk situations.

In innovation activities, the meaning of the business timeline of the innovation project differs between firms across national cultures. Some cultures interpret time and uncertainty of distal future as a prestige because it offers opportunities, and others interpret as anxiety. For instance, collectivist cultures view the timeline through the social value lenses (Hall, 1976). Individualistic cultures experience the time through the lenses of the context-free choice. A handful of empirical studies have begun to explore the nature of time on the abstract versus social dimensions. Following Giddens (1990) on time, one study documents an experiment on distanciation of time from space and ecology in the intra-national differences (Keefer et al., 2017). Likewise, international differences on the notion of time and uncertainty have occupied a large bulk of the cross-cultural research (Hofstede, 2001). If the interpretative meaning of time differs on the abstract–concrete spectrum, then the prestige factor of past versus future or abstract versus concrete brings various levels of prestige and power.

The prestige power of the interpreted time of the project will affect the scope decision in three interactive steps in the innovation project timeline. First, the interpreted project time differs across sponsors. Second, the project time differs from the project life cycle. Third, the culture-based values of temporality differ from the project time. These three interactions shape the interpretation and decision about the scope of the innovation activity based on the empirical evidence from different decision contexts. One study shows that temporal perceptions and its prestige influence chief executive officer (CEO's) decisions (Chen & Nadkarni, 2016). Another study shows that the order of time influences the technical decisions in medical practice (Menchik, 2014). The third set of studies shows that the meaning of time and interpretative value in social context differ in the contextualized decision-making (McGrath & Tschan, 2003; Waterworth, 2003). For instance, social situation or local context defines the temporal duration of a television show rather than the intrinsic pressure of time constraints (Clayman, 1989). Therefore, following the literature in organizational contextual decisions (March, 1999), we propose that the project timeline influences the prestige power, discretion and inflated reward evaluation when compared to deflated risk evaluation in setting the scope of the R&D activity.

Hypothesis 4 (H_4): The innovation project's temporal prestige will associate with a broader scope of the R&D activity.

Project Structural Prestige

The project *structure refers* to the organizational design that predicts a broader scope of the innovation project through high discretionary interpretation of the risk and opportunities of the project. Organizational theorists refer to three types of organizational designs (Scott, 2003). The first type refers to a closed organization, which shows the lowest level of socialization outside its boundaries. The close organizational design relies on the internalized activities within its institutionalized boundaries. The second type of the organizational design shows the inter-organizational interaction, which reflects external socialization. The dyadic relation of the organizations links it to its environment (Baum & Korn, 1999). The third type of organizational design captures the thick network of the organization (March, 1999; Rowley, 1997). The network of the organization, which embeds the organization in its social ecology, will increase the prestige of the organization for good reasons.

First, the size of the network implies a social structure of the network, and the membership of the network enhances the prestige of the participant in that network (Podolny, 1993; Saunders et al., 2012). The broader the network, greater is the increase in organizational visibility. A group of theorists proposes that a non-status characteristic of an organization can gain status by associating with those who have elements of status characteristics (Berger & Fişek, 2006). Empirical evidence explains the organization's legitimacy status by forming network alliances with others in the field (Haunschild, 1994). The implicit interpretation of this assumption suggests that organizational legitimacy increases its prestige and discretionary power (Ridgeway, 1981). Second, the membership of a larger network moves the

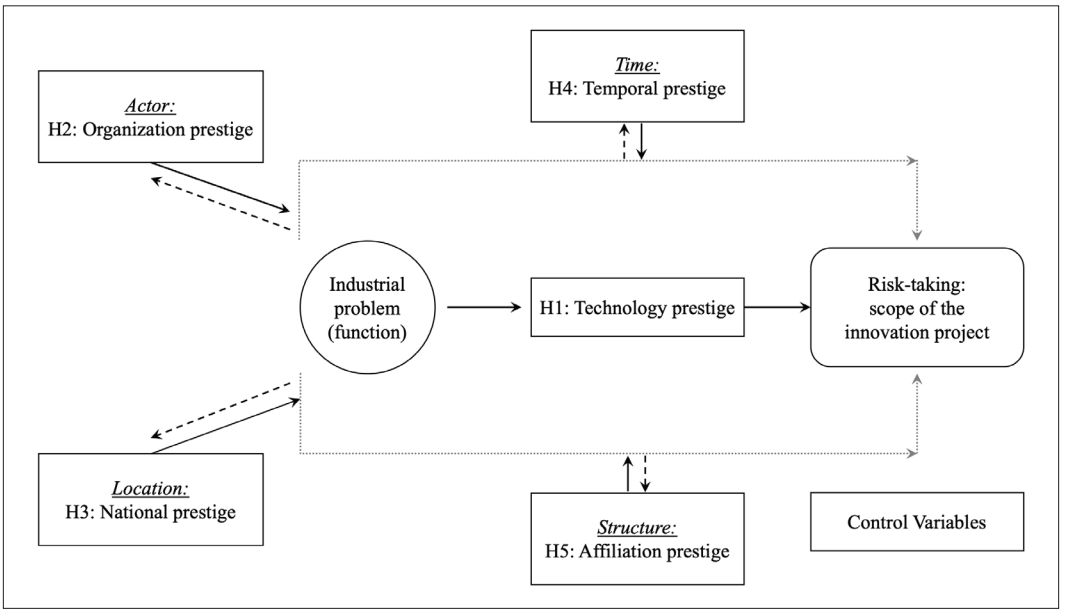

Figure 1. The Conceptual Model of Decision Ecology and R&D Project Scope.

Source: The authors.

Note: H1, Technical prestige; H2, organizational prestige; H3, national prestige; H4, temporal ecology; H5, structural ecology.

responsibility of the actor towards the centre of the network. With the shift in this responsibility away from the decision-maker, the risk of failure and blame also shifts away from the project frontiers to the network. It means that the decision-maker's discretionary power increases, and the increased discretion leads to a broader scope of the innovation project that increases risk levels (March, 1999).

Hypothesis 5 (H_5): The innovation project structural prestige will associate with a broader scope of the R&D activity.

Figure 1 depicts these relationships between the five elements of decision ecology and the project scope. The prestige of the ecology explains the links between the predictors illustrated with arrows and the project scope as the outcome.

Methods

We selected the biopharmaceutical sector for its suitability for the prestige of the innovation project for several reasons. One reason posits that science-driven phenomenon should counteract with the prestige of decision ecology. This sector has the most stringent regulatory requirements for approvals by the Food and Drug Administration (FDA). If the prestige of the ecology matters in this sector, it should also matter in other sectors. The other reason distinguishes business organizations and universities. Most studies focus on entrepreneurial firm's project scope. We use entrepreneurial universities' project scopes. The extant literature follows intra-disciplinary sponsors; we follow interdisciplinary sponsors. Moreover, the innovation project in the biopharmaceutical sector has two important characteristics: organizational analogy and high-risk analogy. In analogy, every project contains organizational activities. A clinical trial project has an average cost of US$1 billion (DiMasi & Paquette, 2004), it strives in an uncertain environment and the uncertain environment demands fillers to reduce some part of the uncertainty (March, 1999). The contextual prestige of the project fills part of this uncertain environment.

Sample

The sample includes entrepreneurial university-sponsored projects that have originated from 23 Organisation for Economic Co-operation and Development OECD economies and China. We used the projects that exist in the database of the National Institute of Health (NIH) in the USA. The projects in the NIH database follow the regulatory supervision of the FDA for approval of various stages of the project. Outside the FDA's supervision and NIH databases, the minor clinical trials amount to numerous observations. However, our focus limits our sample to the reliable, valid and consistent observations. The refined sample includes 5,176 projects from 2000 to 2016 conducted in 24 countries. In short, we selected the OECD countries and added China as the 24th to draw support for the prestige ecology argument.

Variables

Dependent Variable

The dependent variable counts the medical conditions in the R&D project. Biomedical research about clinical trial projects shows that about 65% of the users of a new product in the medical field face more than one medical condition (Higashi et al., 2007). A clinical trial has more than one medical condition in

Table 2. The Ecological Elements, Prestige, Sources and Measures.

Ecological Questions	Concept Levels	Prestige Element	Attributes	Sources	Indicators	Measures
(H1)	Product	Functional prestige	Problem-solution	Professional preference	Practice ranking	Order (low-high)
(H2)	Actor	Actor' prestige	Agent/agency	Organizational attention	Organizational ranking	Ordinal ranking (low-high)
(H3)	Location	Location prestige	Nationality/ Economy	Competitiveness of the location	Economy ranking	National economic ranking (low-high)
(H4)	Temporality	Time prestige	Experiential time	Volunteers, and patient recruitment	Value chain stage	Phases on the timeline
(H5)	Structure	Relational prestige	Coordination	Partners	Alliance/ network	Partner's counts

Source: The authors.

the process. These morbidities define its scope (Turner, 1984), and the scope based on the distinctive conditions implies that the clinical trial targets respective morbidities across national contexts. Some projects target a single condition, and other projects target multiple conditions. Thus, the count of the distinctive conditions measures the scope of the innovation project.

Independent Variables

Five elements form the decision ecology, and each element stands for a variable. Table 2 explains these variables in detail. The following list defines the constituents of decision ecology.

1. **Project technology prestige**: Physicians survey (Album & Westin, 2008).
2. **Organizational prestige**: Online search-based ranking of universities.
3. **Location prestige**: National economic competitiveness measured by the World Economic Forum (2012).
4. **Temporal prestige**: Clinical trial phases of the value chain capture the industrial time. Phase 1 uses healthy volunteers to assess the safety of the technology. Phases 2 and 3 involve thousands of patients to assess the efficacy of the technology. We combined the value chain with the national cultural ecology to develop the temporality variable. The resulting interaction represents the temporal aspect of the ecology (Giddens, 1984). In this interactive variable, the combination of individualism–collectivism and the project's temporal line constitute the variable that echoes with the sociological concept in the literature (Merton, 1982). To develop the composite variable, we multiplied individualism–collectivism with the long-term orientation (Hofstede, 2001) and the product of it with the clinical trial timeline.
5. **Structural prestige**: the number of network alliance partners.

Control Variables

One set of control variables consists of year-dummies. Every year symbolizes a dummy variable. The timing of the first dummy starts from 2000 because a limited number of clinical trial projects existed before 2000 in this database in this set. The other set of control variables consists of the project population in that year in the world. The project population in the industry removes the confounding effects of the intensity of the activity at the firm level and industry level. Several reasons point to the potential confounding effects of the industrial intensity.

The project population-based prestige increases the legitimacy and social acceptance of the project as it does the firm's legitimacy in the population of firms in the industry (DiMaggio & Powell, 1983). If the population of the project field enhances the actor's legitimacy, prestige and discretion (Zucker, 1989), then the prestige and power will influence the scope of the project. Moreover, the role of the project population is stronger in prestige markets versus standard markets. In the standard market, the valuation of exchange depends on conforming to the market norms. In the prestige market, the valuation depends on the prestige of actors because of the uncertainty of the sectoral activity (Aspers, 2009, p. 11). It follows that the project population increases the prestige of the project, but at the same time, it increases conformance with the norms of the market. In such an uncertain situation, the decision-maker tends to use interpretative evaluation of the risk associated with the scope of the project (March, 1999). Thus, the rationale of controlling the project population relies on these reasons.

Model and Analysis

Poisson regression suits an analysis for the count variables (Greene, 1993). A typical Poisson regression takes the log of outcome rate as a function of the predictors in the model and serves as an efficient and effective tool for analysing the count variable in small samples (Aiken & West, 1991). However, the count variable is transformed into a continuous variable by taking its log. First, we transformed it because we have a large sample. Second, the wide range of the scope suggests that most projects have several conditions in the project, while some projects have many conditions. Taking the log reduces the skewness of the variable. The following equation shows the specification:

$$\log_e(Y) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 \ldots$$
$$Y = \left(e^{\beta_0}\right)\left(e^{\beta_1 x_1}\right)\left(e^{\beta_2 X_2}\right)\ldots$$

where

Y = dependent variable, Xs = variables, X_1 = project technology prestige, X_2 = project sponsor's prestige, X_3 = project nationality prestige, X_4 = project temporality prestige (log), X_5 = project structural prestige, Bs = coefficients, β_0 = constant term, $\beta_1, \beta_2, \beta_3, \ldots, \beta_k$ = coefficients of $X_1, X_2, X_3, \ldots, X_k$, respectively, e = the error term,

X = the intercept when the value of all factors approaches zero and β_k and X_k = coefficients of X_k variables (including control variables). Thus, X_1 = the main predictor in the equation.

Results

Table 3 presents the summary statistics. The dependent variable shows the log of the scope of the innovation project. The predictors include the next five variables in the Table 3. Table 3 presents the nationalities of projects and years of the project. The USA has a 63% weight in the sample, and the other countries have about 37% weight in the sample. The data span from 2000 to 2013.

Table 4 presents the inter-variable correlations. The correlations indicate that the correlation values conform to the conventional levels. None of them flag a multicollinearity problem. Thus, with this basic analysis in place, we move to the regression analysis.

Table 3. Shows the Summary.

Variables	Mean	Std. Dev.	Minimum	Maximum
Log of scope	1.87	0.34	0.69	3.37
Project technology prestige	17.97	23.26	0	166
Project sponsor's prestige	5419.84	1585.02	105	7102
Project nationality prestige	135.04	7.28	49	155
Project temporality prestige (log)	8.7	0.6	7.3	10.1
Project structural prestige	5.52	3.96	1	66
Project population	179.55	165.32	0	399
Austria	0.00	0.06	0	1
Australia	0.01	0.09	0	1
Belgium	0.01	0.11	0	1
Canada	0.05	0.23	0	1
Switzerland	0.01	0.11	0	1
China	0.013	0.11	0	1
Germany	0.05	0.22	0	1
Denmark	0.02	0.15	0	1
Spain	0.01	0.08	0	1
Finland	0.00	0.07	0	1
France	0.04	0.19	0	1
Greece	0.00	0.04	0	1
Hungary	0.00	0.01	0	1
Ireland	0.00	0.03	0	1
Italy	0.01	0.10	0	1
Japan	0.00	0.07	0	1
Korea	0.02	0.16	0	1
Netherlands	0.02	0.14	0	1
Norway	0.01	0.08	0	1
Portugal	0.00	0.01	0	1
Sweden	0.01	0.09	0	1
Turkey	0.00	0.04	0	1
UK	0.06	0.23	0	1
USA	0.64	0.48	0	1
Y00	0.02	0.13	0	1
Y01	0.02	0.14	0	1
Y02	0.03	0.17	0	1
Y03	0.05	0.21	0	1
Y04	0.05	0.23	0	1
Y05	0.08	0.27	0	1
Y06	0.09	0.28	0	1

(Table 3 continued)

(Table 3 continued)

Variables	Mean	Std. Dev.	Minimum	Maximum
Y07	0.11	0.31	0	1
Y08	0.11	0.32	0	1
Y09	0.12	0.33	0	1
Y10	0.12	0.33	0	1
Y11	0.11	0.31	0	1
Y12	0.09	0.28	0	1
Y13	0.00	0.04	0	1

Source: The authors.

Table 4. Inter-variable Correlation.

Variables	1	2	3	4	5	6	7
Log-scope	1						
Tech prestige	0.080**	1					
Project population	0.028*	0.032*	1				
Organizational prestige	−0.052**	−0.018	0.082**	1			
Location prestige	−0.007	0.032*	0.141**	−0.035*	1		
Time prestige	0.079**	−0.135**	−0.044**	−0.098**	−0.076**	1	
Structure prestige	0.003	−0.012	0.138**	0.010	−0.004	−0.004	1

Source: The authors.

Note: **$p < 0.01$ and *$p < 0.05$.

Table 5. Regression Results of Individual Models of Each Ecological Factor.

	Standardized Beta					
Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	1.74 (0.04)*	1.75 (0.04)*	1.76 (0.04)*	1.83 (0.10)*	1.73 (0.03)*	1.78 (0.04)*
Years (2001–2013)	Entered	Entered	Entered	Entered	Entered	Entered
Technology	0.08 (0.00)*					
Sponsor			0.043 (0.00)			
Location				−0.01 (0.001)		
Time					0.09 (0.004)*	
Network/alliance						0.002 (0.001)
Project population		0.028 (0.00)*				
F-statistics	8.4*	6.2*	6.4*	5.9*	11*	5.9*
R-square	0.02	0.014	0.013	0.013	0.038	0.013
DOF	14	14	13	14	14	14

Source: The authors.

Note: $N = 5175$ and *$p < 0.01$.

Table 6. Tests the Hypotheses in the Full Model.

	Standardized Beta		
Variables	Model 1	Model 2	Model 3
Constant	1.77 (0.04)**	1.61 (0.08)**	1.72 (0.08)**
Years (2001–2013)	Entered	Entered	
Project ecology prestige		0.05 (0.000)**	0.05 (0.000)**
Project prestige		0.09 (0.000)**	0.09 (0.000)**
Sponsor prestige		0.21 (0.000)**	0.09 (0.000)**
Project nationality		0.01 (0.001)	0.01 (0.001)
Project temporality prestige		0.08 (0.001)**	0.08 (0.001)**
Project structural prestige		0.10 (0.000)**	0.10 (0.000)**
F-statistics	6.4**	12.32**	20.9**
R-square	0.013	0.054	0.032
DOF	13	18	6
N	5,162	3,564	3,564

Source: The authors.

Note: Dependent variable = log of scope (standard error in parentheses).

Temporality = (IDV × LTO × Phases).

**$p < 0.01$.

Table 5 presents the regression results of individual modes of the conceptual factors in their respective columns. Each model shows each predictor along with 13 dummies of years. Individually, the location, time and structural variables show insignificant results. We expect that the absence of some of the moderating effects of other variables causes this insignificant result. Thus, we introduce the full model in the Table 6.

Table 6 presents a full model to test the hypotheses. It shows the dummies for years. Model 1 includes controlled variables and excludes the main predictors. Model 2 includes the main predictors and excludes the control variables. Model 3 includes both sets of variables. The result shows that four coefficients positively predict the project scope. According to these four predictors, the higher the interpretative prestige of the decision ecology components, the broader is the project scope. However, the national prestige, which translates into the home country of the project, shows non-significant coefficient. The possible difference between the distance between the home and host country or the macro-level economic evidence explains this finding against the prediction. The discussion section elaborates on these four supporting factors and one contrary factor in the decision ecology prestige.

Discussion

The findings show that the prestige of the decision ecology of the innovation project decision predicts the broad scope of the innovation project in the biopharmaceutical sector. The ecology of the innovation project consists of five elements: technology, sponsor, location, temporality and

structure. These ecological elements reflect on generic questions of what, why, who, when, where and how (Annesley, 2010). The results show support for all questions, except the nationality (location context).

One explanation for the lack of support for the national prestige follows from the empirical level rather than the conceptual level. We used the national economic ranking of the home country of the sponsor. Clinical trials from OECD economies exist across the globe, which suggests a distance between the home and host country of the project. The other explanation lies in the sectoral context. Although nationality prestige has a halo effect on project sponsor, the project's home and host countries may differ. In such cases, the halo effect weakens because a UK's university's project in China or India may involve local managerial decisions. Instead of the national ranking effects, if it were the ranking of science parks, government offices, schools, hospitals, amusement parks and other notable institutions, then the location prestige would have increased the support for the main hypothesis of location (Florida et al., 2017; Jacobs, 1969). In the current scenario, the project-specific locations lack reliable standard indices or data in the world. For instance, although the Silicon Valley and North Triangles in the USA reflect locational prestige, their inter-location comparison poses challenges. We highlight this issue in the limitation after the discussion of findings. Therefore, nationality—one of the five constituents of the decision ecology—lacks support due to the lack of reliable data.

These findings advance the literature on the prestige of the ecology in multiple ways. First, our study focuses on the prestige of the context, discretion and scope of the innovation project. Other researchers have addressed the issue of the scope of the innovation project (DeFillippi & Arthur, 1998; Skinner, 1974). They have ignored the fact that projects have prestige as predictors of the scope. Second, the current study deals with the decision ecology the same way past research has used other contexts. For instance, the ecology of decisions shapes the meaning, value and action in a situation. It argues that identities change when the situation changes, and multiple identities bring multiple rationalities in the decision process (March, 1999). One study addressed the prestige of the project from the occupational perspective (Album & Westin, 2008). Another study addresses ecology without its prestige (Liu & Wu, 2016). A handful of researchers have addressed the prestige of decision ecology: for example, occupational prestige (Sandefur, 2001; Treiman, 1977), managerial prestige (D'Aveni, 1990), national prestige (English, 2007; Shimbori et al., 1963) and economy of prestige (English, 2007). We integrated these strains of the literature and formulated a consistent and cohesive framework on the ecology of the project decision in the high-technology sector.

Fourth, the prior literature suggests that the uncertainty of the situation positively influences the organizational discretion (Hambrick & Abrahamson, 1995). We extend this position and argue that the uncertainty of the situation contributes to the discretion in decision-making, and the interpretation of the uncertainty mediates this relationship. In other words, we move to the micro level from the industrial level of uncertainty and discretion. The ecology shapes the interpretation of uncertainty at the project scope level, whereas the prior literature links industrial uncertainty to the organizational discretion; we link the organizational perceived discretion to uncertainty evaluation, risk inflation and scope decision. In principle, the meaning-making shapes the interaction between the actor and ecological boundaries for the discretion (Boulding, 1989; March, 1999), which follows that the meaning induces identity, power and risk evaluation for the decision.

The interpretative decision-making argument proposes that the functional understanding of the project in the context of its application reflects its social position. The decision-maker's interpretation of the situation shapes the identity, discretion and power of the sponsor. This contextual prestige drove power of the decision-maker to influence the risk and therefore the scope of the project. For instance, occupation prestige has a long history in economic sociology associated with the job status (Treiman, 1977; Young & Willmott, 1956). Recent literature shows that occupational prestige varies between professions but remains stable across nations (Lawrence, 1998; Lin & Xie, 1988; Zhou, 2005). Analogous to the job

status, the functional prestige of the interpreted project elaborates the functional role of variables through the contextualization process; the complex complementarity between the facts and their contexts conditions the comprehensive theorizing (March, 2014). Hence, with the variation of the ecology, the interpretation of the ecology varies, followed by variegated identities, prestige and risk evaluation.

Put directly, the organizational discretion extracted from the prestige of the ecology positively influences the innovation scope. This interpretative perspective of this study counters some of the prior theoretical arguments. The prior literature suggests that TSD explains the variation between groups about entrepreneurial activities and capitalism. The argument suggests that the TSD gives a sense of control over time and space. The abstraction of time and space from the ecology leads to the commodification of temporality. We agree with the part of the argument that the commodification of the time and space affects decisions of those actors who place prestige on economic time. The abstract time, separated from the social context, leads to the first step in viewing time as a commodity. The second step of time as a commodity relies on the sense-making of the time and its context of the commodity. We argue that the time abstracted from its space and context moves the decision-maker to interpret and decide. Therefore, whenever the sense-making increases the prestige of the ecology of the decision, the prestige of that context-specific identity of the decision actor increases, leading to a decision in favour of a broader scope of the innovation project because of inflated rewards and deflated risks.

The current framework offers opportunities to apply and test the findings in other contexts. Although the current findings stem from a science-based sector of the biopharmaceutical industry, other sectors can apply it to context-dependent situations for the decision analysis. The role of context becomes weaker in highly regulated, objective and standardized industrial sectors. The regulation, objective science and standardized procedures define the biopharmaceutical sector. The standardized science-based approach to socio-economic phenomenon suggests that the strategic decisions, rational processes and the context have a negligible effect on the decision ecology. Our study shows that if a decision of the clinical trial project relies on interpreted context and evaluates the risk of the scope, then the R&D projects in high-context sectors will predict a stronger influence on the risk–reward analysis and the scope setting. The clinical trial activity has a lower level of context in its business chain as compared to conventional business activities. The model developed here has replicable value for other sectors. For instance, the theory of decision ecology and its prestige find strength in other R&D project scope. The university–industry appears as a suitable starting point.

Appendix A. Scope of University-sponsored Innovation Projects.

Data	Organizational title	Nationality	Sum	Average Scope	Broadest
2016	Stanford University	USA	952	1.27	18
=	Chicago University	USA	643	2.09	72
=	University of California	USA	3,073[a]	1.72	48
=	New York University	USA	754	1.56	11
=	Washington University	USA	1,122	2.6	92
=	Duke University	USA	998	1.68	23
=	University of Michigan	USA	882	1.52	11
=	University of Minnesota	USA	723	2.08	23
=	Oxford University	UK	410	1.37	7
=	University college London	UK	290	2.92	22
=	Geneva University	Switzerland	108	1.64	12

(Appendix A. continued)

(Appendix A. continued)

Data	Organizational title	Nationality	Sum	Average Scope	Broadest
=	Zurich University	Switzerland	610	1.38	28
=	Munich University	German	131	1.3	9
=	University of Berlin	German	450	1.38	6
=	Kyoto University	Japan	40	1.85	5
=	Tokyo University	Japan	39	1.49	4
=	Grenoble University	France	306	1.52	6
=	University of Copenhagen	Denmark	468	1.50	6
=	Tel Aviv University	Israel	29	1.28	3
=	Seoul National University	Korea	1,016	1.41	7
				1.7	20.7

Source: The authors.

Note: [a]All universities under the federation, project scope range (3–92). '=' refers to the year 2016.

Appendix B. Scope of Firm-sponsored Innovation Projects.

Date	Sponsor	Nationality	Projects	Average Scope	Maximum Scope
2016	Pfizer	USA	4,473	1.36	48
2016	Eli Lilly	USA	1,279	1.24	11
2012	Johnson & Johnson	USA	813	1.65	9
2012	Wyeth[a]	USA	654	1.28	6
2012	Amgen	USA	593	1.96	16
2016	Bristol-Meyers	USA	1,790	1.30	10
2012	Biogen	USA	260	1.78	5
2016	Abbott Labs	USA	3,212	1.56	35
2012	AstraZeneca	UK	1,941	1.32	8
2012	Glaxo	UK	3,212	1.56	34
2012	Novartis	Switzerland	2,536	1.27	18
2016	Roche	Switzerland	3,011	1.22	10
2016	Boehringer Ingelheim	German	1,930	1.27	9
2012	Bayer	German	992	1.30	9
2012	Astellas	Japan	3,212	1.51	5
2012	Daiichi Sankyo	Japan	192	1.56	12
2016	Sanofi	France	3,212	1.52	24
2016	Novo Nordisk	Denmark	845	2.7	20
2016	Teva Pharma	Israel	552	1.22	17
2016	Samsung Pharma	Korea	547	1.37	7
				1.5	15.65

Source: The authors.

Note: Scope: Count of morbidity conditions and processes.

[a]**One** of the projects has 48 conditions (compared to the average of 1.32 conditions) before the firm's acquisition.

The discretionary decisions based on the sense-making of the ecology caution and give a tool to policymakers. It cautions decision-makers to pay attention to the context. The rational decision appears less rational. The framework in this study shows that a large part of the decision process has subjective attributes. If future studies support this framework, then it gives an effective tool to decision-makers to evaluate decisions before and after acting on the project. Every innovation project needs careful planning at the outset. The framework of this study as a tool for the decision directs attention to objective and subjective parts of the decision. The contexts dilute decision-making. Does the context-based decision create new knowledge and new products? The organizational sponsor and stakeholders need to be aware of the technical and ecological prestige when compared to the consequence-based rational decision. Based on these evaluations, organizations decide whether to continue, amend or end the project.

Several limitations merit mentioning here. First, the scope needs multiple levels of analysis. Second, a stronger cause–effect relationship needs a longitudinal research design. Third, the national cultural differences influence the risk–reward evaluation, with and without prestige and at various levels of prestige. Fourth, the claim that this study will have replicability in other sectors needs conditions. Literature suggests that industries differ in their prestige levels, which differently evaluate the project's risk to reward ratio (Sharkey, 2014). Therefore, prestige-specific industries will offer rich analysis and conclusions.

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