Available online at www.sciencedirect.com

ScienceDirect

International Journal of Project Management 34 (2016) 1322 – 1327

International Journal of Project Management

www.elsevier.com/locate/ijproman

Editorial

Genesis of the special issue

This Special Issue on uncertainty, risk & opportunity, resilience & anti-fragility is the result of a multiple year's maturation process. It started in 2012 with the tentative setting of a Collaborative Research Center in Australia, leading to the organization of Development Working Group at EURAM 2014, and sub-theme at EGOS 2015.

Indeed, governance of risk in the context of major projects is a "hot topic" for a number of organizations, governments and stakeholders, from multinational corporations to NGOs or social groups, considering their huge impact on economy and society (Cantarelli et al., 2010). World Development Indicators (2015)[1] data indicate that 22% of the world's $73,5 trillion gross domestic product (GDP) is gross capital formation, which is almost entirely project based. The reports from National Audit Office (UK), from the Norwegian Auditor General or from Auditor Generals in various states in Australia show that the major projects exhibit high failure rates due to underestimating the extent of risk, uncertainty and complexity involved. According to the PMI's Pulse of the Profession – The High Cost of Low Performance report (March 2013) an average of 13.5% of project budgets are at risk. The Task Force Report "Complex Project Management: Global Perspectives and the Strategic Agenda to 2025" (International Centre for Complex Project Management (ICCPM) and Global Access Partners (GAP) (ICCPM, 2011) acknowledges:

> "*The management of risk is central to an organisation's decision-making framework. Risk can be viewed through the lenses of cost, time, quality, human resources, capability and environmental impacts, but whatever the terms in which it is assessed, the management of risk is intrinsic to behaviours and the implementation of real outcomes. As risk is subjective in nature, what is risky in one circumstance may not be risky in another due to factors such as experience, appetite, knowledge, education, established processes and culture – its management cannot be avoided simply by statements of risk apportionment and responsibility in a contract.*" (p. 30).

1. Risk and its relation to action and uncertainty

1.1. A society of risk

The above-mentioned increased attention paid to risk is anchored in what Beck (1992) and Luhmann (1993) define as the emergence of a society of risk. For Luhmann, the emergence of risk is due to the huge increasing complexity of modern society, "*making ignorance and uncertainty at the very heart of knowledge*" Le Bouter, 2014, p. 34). While sharing the view that risks are rooted in decision making processes, Beck and Luhmann have a contrasted constructivist perspective, realist for Beck – risks are products of the of actions and decisions of political, technological and economical systems – and radical for Luhmann – risks are first and foremost socially constructed and sensibility to risk is explained by new mode of observation and communication emerging with modern society. But both acknowledge the need for new conceptual lenses: linear theories are not taking into account ignorance as constitutive dimension of the problem of knowledge, while non-linear theories recognize it as a central, leading to a plurality of forms of rationality, and contradictory certitudes (Le Bouter, 2014, pp. 34—35).

1.2. From action and uncertainty to risk

Questioning the conceptual relations between risk, action, decision-making, uncertainty takes its roots in a long philosophical tradition.

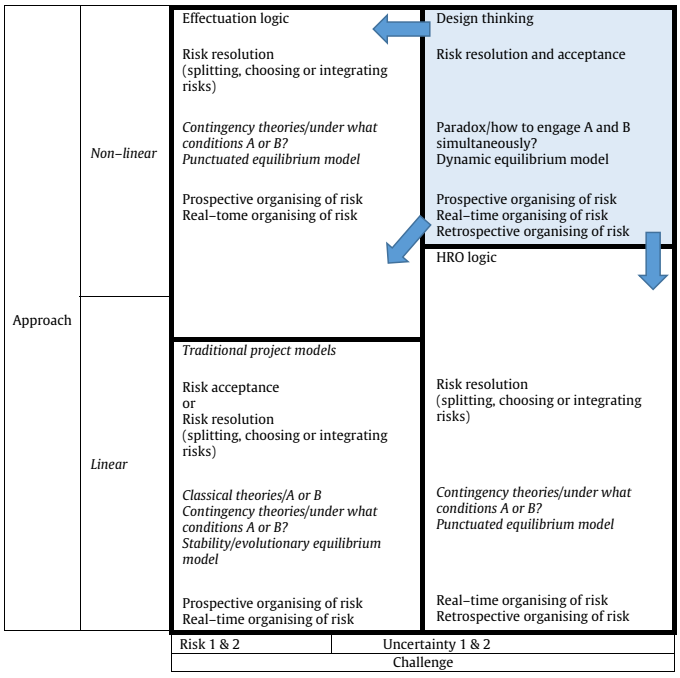
Because action takes place over time, and because the future is unknowable, action is inherently uncertain (Von Mises, 1949). In relation to future, deliberation (judgement and decision-making) and inherent uncertainty, Aristotle noted,

> "*But we only deliberate about things which seem to admit of issuing in two ways; as for those things which cannot in the past, present, or future be otherwise, no one deliberates about them, if he supposes that they are such; for nothing would be gained by it.*" (On Rhetoric (Aristotle, 1926).

[1] From World Bank Indicators web site url http://data.worldbank.org/indicator/NE.GDI.TOTL.ZS, accessed on 9 Juily 2016.

http://dx.doi.org/10.1016/j.ijproman.2016.06.010

Table 1
Typology of risk organizing approaches.



Action involve time, irreversibility, indetermination and contingence, uncertainty and therefore risk (Davidson and Huot, 1989; Alessandri et al., 1995; Perelman and Olbrechts-Tyteca, 2006; Perminova et al., 2008; Atkinson et al., 2006; Lalonde et al., 2012; Winch and Maytorena, 2011; Sanderson, 2012).

Commenting on the ancient Greek conception of politics, Castoriadis (1991) makes things clear:

> "*If the human world were fully ordered, either externally or through its own "spontaneous operation", if human laws were given by God or by nature or by the "nature of society" or by the "laws of history", then there would be no room for political thinking and no sense in asking what the proper law is or what justice is*. […] *If a full and certain knowledge (episteme) of the human domain were possible, politics would immediately come to an end* […]" (Castoriadis (1991, p. 104).

Thus "*in the social domain in general, and in organizations in particular, uncertainty, ambiguity and politics must go together*". (Tsoukas and Cummings, 1997, p. 671).

In project situations, Lalonde et al. (2012) recognize that

> "*the relationships established between the actors' cognitive schemas and perceptions of the situation, is an uncertain state of affairs. The actors do not deal with clear-cut situations. Indeed, projects by their very nature tend to expand*." (Lalonde et al., 2012, p. 425).

Kraaijenbrink (2010, p. 2) calls for giving uncertainty a more explicit place in management theorizing and research.

The ways of coping with uncertainty and risks in management actions and decision-making has been widely discussed and lead to define risk and uncertainty in many ways (Huff, 1978; Gifford et al., 1979; Jauch and Kraft, 1986; Waldman et al., 2001; Carson et al., 2006; Griffin et al. 2007; Cannella et al., 2008). Many authors refer to Knight (1921) (external environment, asymmetric information and related market perspective) (on Knight see: Jarvis, 2010) and to Keynes (known unknowns: "*…there is no scientific basis on which to form any calculable probability whatever. We simply do not know*" (Keynes, 1936:1964, pp. 113–114) (on Keynes see: Dow, 1995).

In the project management space, recent paper by Pasian & Silvius reviewing the last five years of project management research enlightens that risk management is the recurrent topic of interest (Pasian and Silvius, 2016, p. 8). A number of authors, building on Keynes and Knights differentiation between risk and uncertainties have suggested fourfold categorisation (e.g. Courtney et al., 1997; Declerck et al., 1997; Pich et al., 2002; Snowden and Boone, 2007; Winch and Maytorena, 2011; Sanderson, 2012). Building on Boisot and McKelvey (2010) Power-Law distribution (p. 416) and Ashby Space (p. 421) we can tentatively summarize as follows the works done in this area (see also a similar categorisation recently offered by Daniel & Daniel (2016, p. 13)):

- Risk 1 (objective probability): Gaussian world (mean, standard deviation, variance), Atomistic ontology, Ordered regime
- Risk 2 (statistical probability): Gaussian world (mean, standard deviation, variance), Atomistic ontology, Ordered regime
- Uncertainty 1 (known unknowns – subjective probability): Paretian world, Connectionist ontology, Complex regime
- Uncertainty 2 (unknown unknowns – unpredictability): Paretian world, Connectionist ontology, Chaotic regime

Therefore, far seeing in the risk and uncertainty inherent to action tyranny of the particular, of the local, and of the timely to be escaped (Toulmin, 1990, p. 30–35), we see rather a place for emancipation (Habermas, 1973; Gadamer, 1975) and freedom enabling to deliberate in a wise manner (Aristotelian *phronesis*) and to act to create '*a*' desirable future.

2. Organizing risk: pluralism and paradox perspective

2.1. Organizing risk

To date, there has been a predisposition for theorizing "standard" risk management, based on a deterministic "if-then" lens and the modernist assumption made by standard models (Brunsson et al., 2012) that the rules of the game are stable (Toulmin, 1990). Whilst this maybe sufficient when the future is clear enough to develop valid forecasts, in many cases this is not the case, and a more fundamental rethinking of risk and its management is necessary (see above Beck, 1992; Luhmann, 1993). Even if the most uncertain contexts contain some knowable information, intensified uncertainty would suggest

that we need to go beyond standard approaches (Sandberg and Tsoukas, 2011). We argue that more holistic approaches to risk management and its societal impact (Beck, 1992; Luhmann, 1993) are required. One such approach is grounded in Aristotelian philosophy, which conceptualizes actions as involving "projection in the future", i.e. time, irreversibility, indetermination and contingence, inherent uncertainty and therefore risk (Maguire and Hardy, 2013). The Aristotelian approach invites us to understand decision-making and actions as underpinned by an ethic of character, shifting the focus from rules to a dialogue supported by practical wisdom, *phronesis* (Flyvbjerg and Sampson, 2001), and particularly "*the ethical implications of risk for individuals*, *organizations and society*" (Miller, 2009, p. 170). In other words, a move from a "theory of the game" which aims to make playing the game simpler in a complex world, to a "theory of the rules of the game", which aims to influence the rules of the game through debate.

Recognizing that "*it is predominantly in and through organizations that risks are produced*, *evaluated*, *and managed* (*Gephart et al*., *2009*)" (Hardy and Maguire, 2016, p. 81), these two authors highlight organizational research limitations in explaining what organizations do and should do in order to deal with risk. This for two main reasons (Hardy and Maguire, 2016, p. 81):

1) "*with few exceptions* (*e.g*., *Gephart* et al., *2009*; *Maguire & Hardy*, *2013*), *organizational researchers have not explored the implications of organizations' being situated in a dominant discourse of risk*."
2) "*existing work on risk has developed*, *for the most part*, *in three separate streams*, *each of which focuses on a single way— or mode— of organizing ri*sk": prospective organizing of risk, real-time organizing of risk and retrospective organizing of risk. (Hardy and Maguire, 2016, pp. 94—95)

Research needs to offer a pluralistic view and the connections between these three modes.

2.2. A paradox perspective

In order to do so, we suggest challenging the assumptions underlying classical approaches (Alvesson and Sandberg, 2013) adopting "*a paradox perspective seeks managerial strategies that support contrasting elements simultaneously*" (Smith and Lewis, 2011, p. 396). This, in full coherence with what we briefly expose above suggesting to move from linear to non-linear theories *leading to a plurality of forms of rationality*, *and contradictory certitudes* (Le Bouter, 2014, pp. 34—35).

While the classical theories look for a choice between alternatives (A or B?) in comparing them and looks for one best way to succeed, and contingency theory asks "under what conditions A or B?", with the help of mean, tendencies and limited variables and seek for alignment and consistency with internal and external environment enable success, the paradox perspective aims at recognizing and addressing tensions (How to engage A and B simultaneously?), systemic, discursive and contextual methods, considering contradiction as inherent and possibly being powerful to enable peak performance if harnessed (Smith and Lewis, 2011, p. 395).

3. Risk organizing approaches and possible research agenda

3.1. Mapping risk organizing approaches

Based on the above discussion, we suggest a possible typology of risk organizing approaches (Tywoniak and Bredillet, 2016). We build the proposed typology taking into consideration linear approaches and non-linear approaches both for the continuum risk/uncertainty and the possible approaches (see Table 1).

In situations of uncertainty where prediction is not possible, it is to the advantage of the manager to anticipate in controlling what they can influence, for instance the level of loss they can afford. This logic has been called "*effectuation*" (Dew et al., 2009).

High reliability organizations (HROs) logic is characterized by error-free operations over extended time periods in hazardous environments (Roberts, 1990). HROs face high uncertainty and complexity, whilst working in a tightly coupled system characterized by: "*time dependent processes*", "*invariant sequence of operations*", "*one way to reach a goal*", and "*little slack*" (Roberts, 1990, p. 108–109).

The introduction of design thinking was triggered by the failure of traditional business plans for new ventures and the development of new products and challenging "*the assumption that it's possible to figure out most of the unknowns of a business in advance*, *before you raise money and actually execute the idea*" (Blank, 2013, p. 67). A logic of iterative discovery is substituted to a logic of prediction and unknowns associated to ignorance can be learned about in the iterative process. Design thinking logic and its related paradox perspective has the potential to broaden its scope of application both with regard to research and practise.

3.2. Outline of a possible research agenda

On this basis, we outline the direction for a possible research agenda, with three related dimensions, embedded in the suggested typology of risk organizing approaches:

1. Understanding complexity, uncertainty, risk and opportunity, and resilience such as:

   ↪Drivers of human behaviour such as ethics associated with non-technical risks (Tsoukas and Cummings, 1997)
   ↪How complexity and uncertainty is related to risk perception? (O'Leary, 2012)
   ↪How different types of uncertainties and risks combine and interact (Williams, 2002; Williams et al., 2012)?
   ↪Can we separate uncertainty and risk management from project control or should we integrate them? (Jarvis, 2010)

2. Governance vs. Governability of risk, including

   ↳How to adopt a holistic and integrative approach to uncertainty and risk governance (Sanderson, 2012)?
   ↳do we need new contractual arrangements to better cope with pluralistic or conflicting stakeholders' perspectives? (Miller and Hobbs, 2009)
   ↳Can we develop a governance framework including a collection of configurable reference models that can be customized to specific project, programme and portfolio risk circumstances (exemplified for instance in Jackson's contextual framework (Jackson, 2003) or in Kurtz & Snowden's Cynefin framework (Kurtz and Snowden, 2003)?
   ↳How to assess an organization's appetite for risk, risk culture and behaviour such as Flyvbjerg's optimism bias and strategic misrepresentation and reference class, 2006)?

3. Managing risk and opportunity, such as:

   ↳How risk management strategies seek to mitigate risks by absorbing risk impacts through the development of emergent opportunities (Lechler et al., 2012)?
   ↳Is it possible and how to elaborate proactively risk mitigation strategies supported by appropriate risk management configuration and or processes (resilience, anti-fragility (Taleb, 2012))?

3.3. The papers of this special issue in the landscape

Fitting well with the first dimension "understanding complexity, uncertainty, risk and opportunity, and resilience" of the suggested research agenda, the introductory paper Thomé et al., (2016-this special issue) offers a bibliometric analysis of 1275 project management and supply chain management research papers addressing the four concepts of complexity, uncertainty, risk and resilience. The authors propose a conceptual framework linking the four concepts. Beyond two complementary perspectives (focus on individual agents and entities vs. network) the authors highlight the emergence, after 2005, of risk management as a key thematic from the project management thematic (before 2004). In the recent years (after 2009) while project management and risk management seem to be less central as thematic, they strongly relate to research on performance and strategy, both central and developed areas of interest.

With regard to the "governance of risk" dimension, Cuppen et al. (2016-this special issue) paper, building on the retrospective analysis of a major infrastructure project, show how external stakeholder management is a critical part of governance of risk. They unveil the transitory and dynamic nature of such projects, especially with regard to external stakeholder engagement and management. They propose to use Q methodology, "combining the open nature of qualitative methods with the structuring nature of quantitative methods", to conduct stakeholder analysis, allowing for the identification of marginal and divergent viewpoints to emerge from the data, these viewpoints being "*critical in understanding and facilitating productive stakeholder engagement*". They perform this adaptive and flexible approach to analyse a Dutch shale gas exploration project and conclude on its value. The paper ties the "HRO logic" cell of the typology building both on risk acceptance and resolution, prospective and real-time organizing and a punctuated equilibrium underlying dynamic.

Four papers are good examples of the "managing risk and opportunity" dimension.

Floricel et al. (2016-this special issue) investigate in depth complexity and uncertainty reduction strategies and their impact on project performance. Starting from the premise that "*complexity is a major source of uncertainty and risk in projects and affect project performance*" they propose a typology of project complexity crossing on the hand structural and dynamic complexity with intrinsic and representational complexity. After identifying planning stage strategies (separate organization, integrate organization, existing knowledge exploitation and new knowledge production) and project performance dimensions (completion, innovation, operation and value creation), they suggest a rich conceptual framework summarizing how types of complexity influence performance while being moderated by selected strategies. Their paper present then the results and discussion of the quantitative part of the research, leading to identify which strategy helps to deal with complexity for which performance outcome. The paper fits well with the "effectuation logic" cell of the suggested typology focusing on risk resolution (reduction), prospective and real-time organizing and a contingency approach.

Suggesting "*a new orientation to deal with uncertainty in projects*", Böhle et al. (2016-this special issue) challenge the fact that plan-oriented methods can address not (completely) foreseeable uncertainty. Taking a sociological perspective, the authors demonstrate that projects are characterized by a dual uncertainty (limits of planning to face unexpected events and process for coping with these events), and that coping with this dual uncertainty involves experience-based subjectifying action in order to not only eliminate but also utilize uncertainty, and therefore accept it, to create value. The main conclusion is that "*both plan-oriented action and experience-based subjectifying action are necessary and should be used*". The paper matches the "Paradox logic" cell of our typology focusing on risk resolution, retrospective and real-time organizing and a dynamic equilibrium underlying reasoning.

Arashpour et al. (2016-this special issue) address the issue of interacting uncertainties, between of-site and in-site activities, in hybrid construction projects. They highlight the need for a holistic risk analysis approach in order to assess the integrating impact of uncertainties of the project performance. Building on a framework identifying the main risk-related problems in such projects, and a critical analysis of various simulation models, they gather data from two large Australian construction companies. On this basis they run Monte Carlo simulation (discrete event simulation experiments) analysing different "what-if" scenarios. From the results they offer four important propositions "*explaining the impact of interacting uncertainty on project completion time*" in such projects, as well as practical implications. The paper fits with the "traditional project

management logic" cell of the typology addressing risk resolution, prospective organizing and a stability/evolutionary equilibrium model.

A "*major infrastructure risk assessment framework*" (MIRAF) is proposed and tested by Wang et al. (2016-this special issue) emphasizing the Chinese government's need for more prudent decision-making on major infrastructure projects, they conduct an in-depth review of researches on risk assessment for these projects. From there, they design a hierarchical structure of risk factors. They apply the suggested comprehensive MIRAF, an AHP-based risk assessment method, to cross-sea route project in China, explaining in detail each step of the process and alternative scheme comparison. The conclusion highlights the practical value of such framework, contrasting the MIRAF with more narrow approaches. This paper matches the "traditional project management logic" cell of our typology addressing risk acceptance and resolution, prospective organizing and a stability/evolutionary equilibrium view.

References

Alessandri, T. M., Ford, D. N., Lander, D. M, Leggio, K. B., Taylor, M. (1995). Managing risk and uncertainty in complex capital projects. Q. Rev. Econ. Financ., 44: 751—767.

Alvesson, M., & Sandberg, J. (2013). Has management studies lost its way? Ideas for more imaginative and innovative research. J. Manag. Stud., 30(1): 128—151.

Arashpour, M., et al., 2016. Analysis of interacting uncertainties in on-site and off-site activities: implications for hybrid construction. Int. J. Proj. Manag. 34 (7), 1393–1402 (this special issue).

Aristotle, 1926. *On Rhetoric. A Theory of Civic Discourse*. J. H. Freese, Ed. HTML at Perseux. http://www.perseus.tufts.edu/hopper/text?doc=Aristot.+Rh.+1.1.1&redirect=true.

Atkinson, R., Crawford, L., Ward, S., 2006. Fundamental uncertainties in projects and the scope of project management. Int. J. Proj. Manag. 24 (8), 687–698.

Beck, U., 1992. Risk Society: Towards a New Modernity. Sage, London.

Blank, S., 2013. Why the lean start-up changes everything. Harv. Bus. Rev. 91 (5), 63–72.

Böhle, F., et al., 2015. A new orientation to deal with uncertainty in projects. Int. J. Proj. Manag. 34 (7), 1384–1392 (this special issue).

Boisot, M. McKelvey, B. (2010). Integrating modernist and postmodernist perspectives on organizations: a complexity science bridge. Acad. Manag. Rev., 35(3): 415—433.

Brunsson, N., Rasche, A., & Seidl, D. (2012). The dynamics of standardization: three perspectives on standards in organization studies. *Organ. Stud.* 33(5–6): 613—632.

Cannella, A., Park, J.-H., Lee, H.-U., 2008. Top management team functional background diversity and firm performance: examining the roles of team member colocation and environmental uncertainty. Acad. Manag. J. 51 (4), 768–784.

Cantarelli, C.C., Flyvbjerg, B., Molin, E.J.E., van Wee, B., 2010. Cost overruns in large-scale transportation infrastructure projects: explanations and their theoretical embeddedness. Eur. J. Transp. Infrastruct. Res. 10 (1), 5–18.

Carson, S. J., Madhok, A., Wu, T. (2006). Uncertainty, opportunism, and governance: the effects of volatility and ambiguity on formal and relational contracting. Acad. Manag. J., 49(5): 1058—1077.

Castoriadis, C., 1991. Philosophy, Politics, Autonomy. Oxford University Press, New York.

Courtney, H., Kirkland, J., Viguerie, P., 1997. Strategy under uncertainty. Harv. Bus. Rev. 67–79 (November–December).

Cuppen, E., et al., 2016. Stakeholder engagement in large-scale energy infrastructure projects: revealing perspectives using Q methodology. Int. J. Proj. Manag. 34 (7), 1347–1359 (this special issue).

Daniel, P., Daniel, C., 2016. Complexity, Uncertainty and Mental Models: from a Paradigm of Regulation to a Paradigm of Emergence in Project Management. In the Proceedings of European Academy of Management Conference, "Manageable Cooperation", June 1 to 4, Paris, France, p. 39.

Davidson, F.P., Huot, J.-C., 1989. Management trends for major projects. Project Appraisal 4 (3), 133–142.

Declerck, R.P., Debourse, J.P., Declerck, J.C., 1997. Le Management stratégique: contrôle de l'irréversibilité. Les éditions ESC Lille, Lille.

Dew, N., Read, S., Sarasvathy, S.D., Wiltbank, R., 2009. Effectual versus predictive logics in entrepreneurial decision-making: differences between experts and novices. J. Bus. Ventur. 24 (4), 287–309.

Dow, S., 1995. Uncertainty about Uncertainty. In: Dow, S., Hillard, J. (Eds.), Keynes, Knowledge and Uncertainty. Edward Elgar, Aldershot.

Floricel, S., et al., 2016. Complexity, uncertainty-reduction strategies, and project performance. Int. J. Proj.Manag. 34 (7), 1360–1383 (this special issue).

Flyvbjerg, B., Sampson, S., 2001. Making Social Science Matter why Social Inquiry Fails and how it can Succeed Again (216 pp.).

Gadamer, H.-G., 1975. In: Barden, G., Cumming, J. (Eds.), Truth and Method. Seabury, New York trs.

Gephart, R. P., Van Maanen, J., & Oberlechner, T. (2009). Organizations and risk in late modernity. *Organ. Stud.* 30 (2–3): 141—155

Gifford, W. E., Bobbitt, H. R., Slocum Jr, J. W. (1979). Message characteristics and perceptions of uncertainty by organizational decision makers. Acad. Manag. J., 22(3): 458—481.

Griffin, M.A., Neal, A., Parker, S.K., 2007. A new model of work role performance: positive behavior in uncertain and interdependent contexts. Acad. Manag. J. 50 (2), 327–347.

Habermas, J., 1973. In: Viertel, J. (Ed.), Theory and Practice. Beacon Press, Boston tr.

Hardy, C., Maguire, S., 2016. Organizing risk: discourse, power, and "riskification". Acad. Manag. Rev. 41 (1), 80–108.

Huff, A.S., 1978. Consensual Uncertainty. Academy of Management Review, July, pp. 651–655.

International Centre for Complex Project Management (ICCPM), 2011). The task force report: global perspectives and the strategic agenda to 2025. https://iccpm.com/content/taskforce-report (Retrieved 21 June 2016).

Jackson, M.C., 2003. Systems Thinking: Creative Holism for Managers. Wiley, Chichester.

Jarvis, D. S. L. (2010). Theorising risk and uncertainty in social enquiry - exploring the contribution of frank knight. Hist. Econ. Rev., 52: 1—26.

Jauch, L. R., Kraft, K. L. (1986). Strategic management of uncertainty. Acad. Manag. Rev., 11(4): 777—790.

Keynes, J.M., 1936:1964. The General Theory of Employment, Interest, and Money. Harcourt, Brace and World, New York.

Knight, F.H., 1921. Risk, Uncertainty and Profit. Houghton Mifflin, Boston.

Kraaijenbrink, J., 2010. Rigor and relevance under uncertainty: toward frameworks as theories for practice. Working Paper (http://www.philosophyofbusiness.org/wordpress/wp-content/uploads/downloads/2011/05/Rigor-and-relevance-under-uncertainty-Kraaijenbrink-20-12-2010.pdf. Retrieved 14 June 2012.).

Kurtz, C.F., Snowden, D.J., 2003. The new dynamics of strategy: sense making in a complex and complicated world. IBM Syst. J. 42 (3), 462–482.

Lalonde, P.-L., Bourgault, M., Findeli, A. (2012). An empirical investigation of the project situation: PM practice as an inquiry process. Int. J. Proj. Manag., 30(4): 418—431.

Le Bouter, F. (2014); La sociologie constructiviste du risque de Niklas Luhmann [*Niklas Luhmann's sociology of risk*]. *Commun. Organ.*, 45: 33—47. (Translation by the authors)

Lechler, T.G., Edington, B.H., Gao, T., 2012. Challenging classic project management: turning project uncertainties into business opportunities. Proj. Manag. J. 43 (6), 59–69.

Luhmann, N. trad. Barrett, R. (1993). Risk: A Sociological Theory: De Gruyter: Berlin. (236 pp.).

Maguire, S., & Hardy, C. (2013) Organizing processes and the construction of risk: a discursive approach. *Acad. Manag. J.* 56(1): 231—255.

Miller, K. D. (2009). Organizational risk after modernism. *Organ. Stud.* 30 (2–3): 157—180

Miller, R., Hobbs, B., 2009. The Complexity of Decision-Making in Large Projects with Multiple Partners: Be Prepared to Change. In: Williams, T.M., Samset, K., Sunnevåg, K.J. (Eds.), Making Essential Choices With Scant Information. Springer, pp. 375–389.

O'Leary, T., 2012. Decision-making in Organisations. In: Williams, T.M., Samset, K. (Eds.), Project Governance. Palgrave Macmillan, Basingstoke, p. 46.

Pasian, B., Silvius, G., 2016. A Review of Project Management Research in IRNOP and PMI Conferences from 2009 to 2014 to Identify Emerging Perspectives. In the Proceedings of European Academy of Management Conference, "Manageable Cooperation", June 1 to 4, Paris, France, p. 19.

Perelman, C., Olbrechts-Tyteca, L., 2006. The New Rhetoric: A Treatise on Argumentation. University of Notre Dame Press, Notre Dame, Indiana.

Perminova, O., Gustafsson, M., Wikström, K., 2008. Defining uncertainty in projects—a new perspective. Int. J. Proj. Manag. 26, 73–79.

Pich, M. T., Loch, C. H., De Meyer, A; (2002). On uncertainty, ambiguity, and complexity in project management. Manag. Sci., 48(8): 1008—1023.

PMI, 2013. PMI's Pulse of the Profession — The High Cost of Low Performance Report. Project Management Institute. PA, Newton Square.

Roberts, K.H., 1990. Managing high reliability organizations. Calif. Manag. Rev. 32 (4), 101–113.

Sandberg, J., & Tsoukas, H. (2011). Grasping the logic of practice: theorizing through practical rationality. *Acad. Manag. Rev.* 36(2):338—360.

Sanderson, J., 2012. Risk, uncertainty and governance in megaprojects: a critical discussion of alternative explanations. Int. J. Proj. Manag. 30, 432–443.

Smith, W.K., Lewis, M.W., 2011. Toward a theory of paradox: a dynamic equilibrium model of organizing. Acad. Manag. Rev. 36 (2), 381–403.

Snowden, D.J., Boone, M., 2007. A leader's framework for decision making. Harv. Bus. Rev. 85 (11), 69–76.

Taleb, N.N., 2012. Antifragile: Things That Gain from Disorder. Random House, NY.

Thomé, A.M.T., et al., 2016. Similarities and contrasts of complexity, uncertainty, risks, and resilience in supply chains and temporary multiorganization projects. Int. J. Proj. Manag. 34 (7), 1328–1346 (this special issue).

Toulmin, S., 1990. Cosmopolis: The Hidden Agenda of Modernity. The University of Chicago Press, Chicago.

Tsoukas, H., Cummings, S., 1997. Marginalization and recovery: the emergence of Aristotelian themes in organization studies. *Organ. Stud.* 18 (4), 655–683.

Tywoniak, S., Bredillet, C.N., 2016. Project Governance and Risk Management: from First-order Economizing to Second-Order Complexity. In: Sankaran, S., Müller, R., Drouin, N. (Eds.), Cambridge Handbook of Organizational Project Management. Cambridge University Press, Cambridge (to be published).

Von Mises, L., 1949. Human Action: A Treatise on Economics. (4th revised ed.). Fox & Wilkes, San Francisco.

Waldman, D. A., Ramirez, G. G., House, R. J., Puranam, P. (2001). Does leadership matter? CEO leadership attributes and profitability under conditions of perceived environmental uncertainty. Acad. Manag. J., 44(1): 134—143.

Wang, T., et al., 2016. A major infrastructure risk-assessment framework: application to a cross-sea route project in China. Int. J. Proj.Manag. 34 (7), 1403–1415 (this special issue).

Williams, T., 2002. Modelling Complex Projects. UK, Wiley, London (284 pp.).

Williams, T.M., Klakegg, O.J., Walker, D., Andersen, B., Magnussen, O.M., 2012. Identifying and acting on early warning signs in complex projects. Proj. Manag. J. 43 (2), 37–53.

Winch, G.M., Maytorena, E., 2011. Managing Risk and Uncertainty on Projects: A Cognitive Approach. In: Morris, P.W.G., Pinto, J.K., Söderlund, J. (Eds.), The Oxford Handbook of Project Management. Oxford University Press, Oxford, pp. 345–364.

Christophe N. Bredillet

PhD, D.Sc., Université du Québec à Trois-Rivières Département Management, Ecole de Gestion 3351, boul. des Forges, C.P. 500 Trois-Rivières, Québec G9A 5H7, Canada

Corresponding author. Tel.: +1 (819) 701-2835.

E-mail address: christophe.bredillet@uqtr.ca.

Stéphane Tywoniak[2]

PhD, Telfer School of Management (University of Ottawa, Canada) 55 Laurier Ave E, Ottawa, ON K1N 6M5, Canada

E-mail address: tywoniak@gmail.com.

[2] Co-author. Tel.: +1 613-562-5731.