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A systematic review of Foresight in Project Management literature

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Abstract

Projects, like companies, do not fail overnight. When a company fails, this is often not much related to operational aspects but to an inability to think holistically about the driving forces that may change its business landscape in a disruptive way. Based on this, organizations are nowadays seeking different approaches to cope with uncertainty, and as a result, Foresight as a supporting tool to long range planning is gaining popularity at corporate and governmental level. Given that projects share with Foresight the same orientation towards the future and both lead with uncertainty, it is thus relevant to ask whether Foresight can be used to improve Project Management practice. In order to research into these questions, this paper conducted a systematic review on the topic of Foresight in leading Project Management literature. The review revealed that an explicit relationship between Foresight and Project Management exists, and although with limitations, evidence suggests that there is value in adopting Foresight. This study makes a contribution to the body of empirical works in this field and is intended to be primarily used by Project Management practitioners and practically-oriented academics who are interested in developing fresh insights into new approaches for better management of projects.

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1. Introduction

In a time when organizations strive to cope with extreme volatility, uncertainty, complexity and ambiguity, to be able to demonstrate competencies of forward-thinking, anticipation and agility are to hold a clear competitive advantage and a mandate in the future. The systemic and complex nature of the phenomena and the challenges ahead call for different approaches and innovative tools for planning, where traditional management competencies, heretofore considered de facto competencies, are still necessary, but are no longer sufficient conditions to succeed in such an unpredictable environment where change is the new normal. In view of this scenario, the discipline of Foresight, also referred as Future Studies, has gained recent interest amongst academia and business players, and is now more systematically used across organizations and governmental entities to support long-term planning. The question should be posed, however, if there are benefits in also applying Foresight tools and principles at a lower level through which the future is actually delivered: portfolios, programs, and projects.

On the one hand, projects are, by definition, a projection of an intended future state, play a pivotal role in shaping, building, and delivering the future of organizations, and are by nature delimited by uncertainty. On the other hand, Foresight as a discipline is concerned with looking into the future, which is always uncertain, and discussing what it might mean for decision-making in the present. Given the common aspects that bring together Foresight and projects, one might naturally assume that there is a close link between both concepts. Driven by this assumption, this paper aims to identify how Foresight fits in the context of Project Management and its value to the discipline, as evidenced in the principal academic research outlets in the Project Management field.

In order to achieve that objective, a systematic review was conducted as it is an acknowledged research method used to discover, evaluate and interpret in an explicit way the breadth of literature available relating to a particular topic. Following the introductory section, this paper is structured as follows: section 2 presents the research methodology and planning adopted in the study; in section 3, execution of the systematic review is performed, and results obtained are presented and summarized; section 4 focuses on data analysis, and discusses how evidence supports (or not) the research questions; finally, a conclusion, as well as limitations in the study, implications, and directions for further research, are presented.

2. Methodology

To provide a robust overview of Foresight in Project Management context, a systematic review approach was adopted. Systematic literature reviews aim to provide explicit, rigorous, reproducible, and auditable methodology for “evaluating and interpreting all available research relating to a particular research question, topic area, or phenomenon of interest”¹. Since individual studies can be dispersed and only represent a single facet of a bigger picture, the value of a systematic review is that it combines discrete pieces and synthesizes results in an organized way, which allows a complete overview of the topic being researched². By performing a systematic literature review, researchers can summarize existing evidence about a phenomenon, identify gaps in current research, and provide a ground framework to position or support new ideas and hypotheses³. For the purposes of this paper, the systematic review conducted provides a theoretical basis for understanding to what extent the topic of Foresight is being addressed in the Project Management literature. In order to investigate this matter, the following research questions were formulated:

- i) Is there a perceived relationship between Project Management and Foresight?*
- ii) If so, what is the relationship, and how strong is it?*
- iii) Is there any value in adopting Foresight as a tool in managing projects in practice?*

The review followed a discrete series of steps, including: (1) identifying relevant literature and assessing its usefulness, (2) extracting data in a systematic way from selected articles, and (3) analyzing the collected data, providing a synthetic overview. Details on each of the steps that form the protocol are described in the following sub-sections of this paper.

2.1. Eligibility criteria

Eight inclusion criteria were used as a guide for selecting and assessing the studies for potential inclusion. To be included in the systematic review, a study had to: (1) be available amongst the selected databases/journals, (2) be written in English, (3) clearly describe its methodology, (4) have sufficient data for the analysis, (5) have been completed and concluded, (6) be unique (have no duplication), (7) have been published in one of the three leading peer-reviewed Project Management journals or in PMI/IPMA conference/ symposia proceedings, and (8) present some result on the direct relationship between Foresight (tools) and Project Management.

2.2. Information sources

Studies were identified by searching the following electronic databases: *Elsevier ScienceDirect*, *Wiley Online Library*, and *Emerald*. Three leading academic journals on Project Management research were used: (1) the Project Management Journal (PMJ): published by Wiley in partnership with the Project Management Institute (PMI), which has an Impact Factor of 0.63; (2) the International Journal of Project Management (IJPM): published by Elsevier in partnership with the International Project Management Association (IPMA), which has an Impact Factor of 1.758; (3) the International Journal of Managing Projects in Business (IJMPB): published by Emerald (no information on its impact factor is provided). In addition, both PMI and IPMA websites were researched. The last search was performed on 11th April 2015.

2.3. Search terms

The starting point to search the selected databases was to use the term “Foresight” in the search box of specific Project Management journals available online (“in this journal”). In order to allow for alternative expressions, “future studies” was also used. In view of a limited number of results, the terms “scenario planning” and “early warning” were included, since they are popular manifestations of Foresight. Whilst conducting an initial reading of the papers, it was identified that the term “early warning” may be used interchangeably with the term “weak signal”, therefore, the latter was later also included. Two other search terms that were initially considered were “future” and “uncertainty”, due to the close syntax affinity of these terms both with the context of projects and with the context of Foresight. However, these were later excluded due to their non-specific dimension. In addition, the search term “trend” was originally considered, but later left off of the search as rarely is it said on causality relationships, how these trends could influence the management of a specific project in practice. The term “forecasting” was also considered initially, but later excluded as it carries a different meaning of the concept of Foresight.

Where a journal homepage existed, a simple search was carried out using the selected search term and the filter “in this journal”. Where the journal and/or database did not offer that option, an advanced search was conducted using search streams, such as “publication title” EQUALS “Project Management” AND “article title” EQUALS “<the intended search term>”. All search terms were searched as article titles, abstracts and/or as keywords in articles. For searches in the PMI and IPMA website, where an appropriate filter was not available, no filters were used in addition to the search term. All search results were extracted as Bibtex files and consolidated into a data extraction sheet.

2.4. Study selection

Eligibility assessment for the inclusion or exclusion of articles in this review was performed in four steps, which are explained in the table below.

Table 1. Study selection procedures.

Step 1.1	Records identified from databases were compiled and duplications were removed.
Step 1.2	The researcher independently read the title and abstract from articles, then selected only the relevant articles and discarded the others.

Step 1.3	The researcher independently read introduction and conclusion from articles, then selected only the relevant articles and discarded the others.
Step 1.4	Full-text articles were assessed for eligibility. The researcher filled a Quality Assessment form for each article and elaborated a summary containing their key-points

In order to assess the quality of the selected articles, a Likert-scale form was used to grade the articles, covering the following dimensions: research validity, risk of bias, relevance, applicability, and consistency of the presented evidence. The scoring scale range used varied from 1 (minimum score) to 5 (maximum score). After scoring each of the selected articles in these five dimensions, the articles were classified into four types: Poor (between 5-10), Regular (between 11-15), Good (between 16-20) and Very good (between 21-25).

2.5. Data collection process

A data extraction sheet was developed for this review, pilot-tested on two randomly-selected included articles and refined accordingly. For the data collection process, the researcher had to fully read the selected papers and extract relevant information according to the data extraction sheet where, ideally, each article would provide significant data and citations which could be used as evidence to support answers to the research questions.

3. Results

This section summarizes the results found in the systematic review. The following flow diagram shows results obtained at each stage.

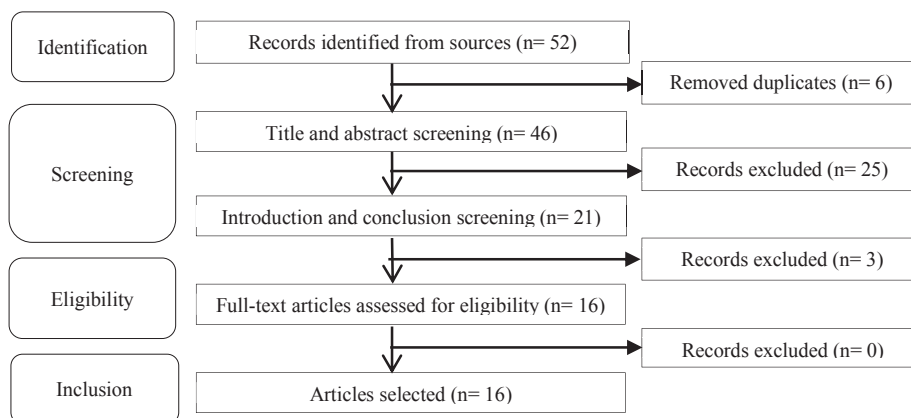


Fig. 1. Systematic review flow diagram.

Sources searched retrieved an initial number of 52 records, from which 46 were gathered for a first selection, after removal of 6 duplicated records. Out of 46 articles selected for the title and abstract screen, 25 records were excluded on the basis of not meeting the defined eligibility criteria. A second selection focused on the reading of introductions and conclusions and screened 21 articles, from which 3 were excluded for being considered not relevant for this review. Finally, 16 full-text articles were assessed in relation to eligibility and quality, and no further articles were excluded, leading to the final number of 16 studies being selected for inclusion. The list of selected studies is shown below.

It should be noted that although the role of eligibility criteria is to help limit the selection bias, and hence enhance the legitimacy of the literature review, if inclusion criteria are used too strictly such a literature review may fail to uncover relevant data. In order to avoid this, this literature review included three studies which did not meet one of the defined inclusion criteria (point (3)), but were interpreted as significant, nonetheless, in respect of the research

objective. Moreover, it should be stated that snowballing technique was not considered in the review, since its focus was solely on PMI/IPMA websites and the three leading Project Management journals.

Table 2. Selected studies.

First Author	Year	Title
Nikander, I. O. ⁴	2001	Project Management by Early Warnings
Williams, T. ⁵	2012	Identifying and Acting on Early Warning Signs in Complex Projects
Dye, L. D. ⁶	2002	Using Scenario Planning as an Aid in Project Portfolio Management
San José, J. C. ⁷	2012	The Future of Project and Program Management--Foresight Workshop
Craddock, T. W. ⁸	2009	What are the roles of scenario planning in Project Management?
Russell, L. ⁹	1998	I wish I'd known: Scenario Planning to Jump Start a Project
Hazir, T. ¹⁰	2014	A review of analytical models, approaches and decision support tools in project monitoring and control
Haji-Kazemi, S. ¹¹	2015	Barriers against effective responses to early warning signs in projects
Haji-Kazemi, S. ¹²	2013	A review on possible approaches for detecting early warning signs in projects
Nikander, I. O. ¹³	1997	Preliminary signals and early warnings in industrial investment projects
Ferraro, J. ¹⁴	2014	Five competencies to successfully drive strategic initiatives
Sánchez, A. M. ¹⁵	2004	Early warning signals for R&D projects: an empirical study
Williams, T. ¹⁶	2010	Early warning signs in complex projects
Haji-Kazemi, S. ¹⁷	2012	A Conceptual Framework for Application of Performance Measurement as an Early Warning System in Projects, an Analysis on the Case of the London Ambulance Service Project
Haji-Kazemi, S. ¹⁸	2013	Application of performance measurement as an early warning system: A case study in the oil and gas industry
Haji-Kazemi, S. ¹⁹	2014	Efficiency of project health checks (PHCs) as an early warning system in practice: A case study in Norway's telecommunication industry

Final selection amongst the records obtained resulted in the following distribution, by database/journal: 4 articles from *ScienceDirect* (IJPM), 3 articles from *Wiley Online Library* (PMJ), 2 articles from *Emerald* (IJMPB), and 7 articles from the PMI website search. No results were obtained from the IPMA website. In summary, 9 articles are part of peer-reviewed journals, while 7 articles were published in conference or symposia proceedings. Regarding dates of publication, the first paper selected was published in 1997 and from there the distribution of papers has remained stable (one result per year), whilst an increase of interest on the topic of Foresight can be found from 2012 onwards, where 3 articles were published in 2012, 3 in 2013, 3 in 2014, and 1 in 2015 so far. In total, 40 citations were extracted from the selected articles. In regards to the quality of the selected studies, 11 studies were classed as “Very good”, 2 as “Good”, and 3 as “Regular”. There were no studies classed as “Poor”, which is indicative of a good level of quality observed, in general. Further details on results by quality assessment are presented in the table below.

Table 3. Results (selected studies) by quality assessment.

Classification	Studies	Total
Very good	4,5,10,11,12,13,15,16,17,18,19	11
Good	6,8	2
Regular	7, 9,14	3
Poor	-	0

4. Data Analysis

One of the key research questions to be answered from this systematic review was whether an explicit relationship between Foresight and Project Management exist and can be observed in leading research Project Management literature. Based on the number and subject of results obtained, some acceptable evidence from literature suggests that there is indeed a relationship between the two themes, although this relationship is still elusively explored and predominantly focused on the subject of early warning indicators in projects^{4,5,10,11,12,13,15,16,17,18,19}. Evidence regarding other subjects within the Foresight field, such as horizon scanning, wildcards, or trend analysis is weak or inexistent, which might highlight a gap in literature and an opportunity for further research.

The relationship between Foresight and Project Management is displayed in the table below and illustrates the emphasis of early warning indicators as an area of considerable interaction with Project Management, while other areas of potential value have little supporting empirical evidence. Due to its proactive nature, there is an unsurprisingly strong association with the topic of risk management^{8,12}.

In regards to the identification of early warning indicators, this area is clearly perceived as of value to the Project Management discipline and has been the subject of increasing interest by the academic community, although practical research is still limited. The advantage to be gained in the identification of these weak signals throughout the project is based on the assumption that even though the future is always surrounded by uncertainty, organizations may however be prepared to better handle strategic surprises and better able to adapt to change by scanning weak signals in the project environment because most of the discontinuities do not emerge without warning. A link between scenario planning and portfolio management is also noticed⁶, where to get the right mix of projects and resources that are resilient to different scenarios is critical to the effectiveness of the strategy of organizations. Since scenario planning allows new strategies to emerge and existing ones to be rehearsed in advance, having this capability in place suggests an increased resilience and confidence in strategic planning and in the long-term robustness of the portfolio of projects. However, additional empirical studies are required to support this view.

Table 4. Areas of interaction between Foresight and Project Management.

Area of Interaction / Value	Relevant Studies	Exemplary citations
Risk Management	8,12	“The primary role (of scenario planning) appears to be in risk management. The concept of scanning for indicators of fundamental changes in the overall environment that signal a variance from the planned future is central to effective Project Management.” ⁸
Project Monitoring (Early Warning Indicators)	4,5,10,11,12,13,15,16,17,18,19	“Identifying and acting on early warning signs is particularly important in the initiation or set-up phase of the project, but also relevant in later phases, including execution.” ⁵
Portfolio build	6	“A scenario-based approach to portfolio management will focus management energies and resources on those projects that will best position the organization to pursue whichever scenario materializes.” ⁶
Decision-making and learning	8	“(…) the dual purposes of scenario learning are expanding “decision makers’ understanding of possible futures and enhancing decision making” (p. 3). Both of these are desirable from a Project Management perspective.” ⁸
Project success factors	15	“Although we did not analyse causal relationships between early warning signals and project success factors, the associations between some of these variables suggest that early warning signals could be predictors of project success factors.” ¹⁵
Project management competencies	14	“A project manager works in the present with a plan for the future; a service-based project leader works in the present to bring about the future. Foresight is necessary to move project teams from reaction to proactive anticipation.” ¹⁴

Further to the previous point, development of decision-making and learning abilities is also an area where Foresight can contribute to the practice of project portfolio management⁸. Since Foresight considers not just one version of the future but several, this brings additional risks, opportunities, and factors into play, which can enrich the decision-making process and allow a richer and wider view of what lies ahead. A tenuous link between early warning indicators

and critical success factors in projects was also identified¹⁵ but requires further investigation. Finally, one article also acknowledged Foresight as a critical competency to be acquired and developed by project managers¹⁴. Using the same rationale that guides early warning indicators, there is a practical reason to assume that the ability to look-forward can be beneficial to individuals managing projects.

After concluding that a relationship between Project Management and Foresight exists, the next important question to be answered is whether there is any value in adopting Foresight as a tool to manage projects. Based on the findings from this review, it can be said that there is actually a potential value to be gained, particularly on the areas of risk management and portfolio planning, as described above. In addition to these specific areas, the contribution of Foresight to Project Management is expected to develop directly from its value to strategic management, that is, lies on its ability to challenge the status quo and expectations, to influence decisions at the project level, as well as to build capabilities of preparedness and resilience, thus supporting the formation of an anticipatory culture in the organization, where one does not simply react to the future but actually prepares for it. The abilities of anticipation and resilience are closely related to the principle of agility as postulated by the wave of Agile approaches in Project Management²⁰, therefore, there is an underlying common link perceived in relation to the goals of both Agile and Foresight towards organizational agility.

Also Chugh²¹ argues that a discipline needs to be clearly distinguishable as either a science or an art in order to be successful beyond theory, in the real world. Whilst the discipline of Foresight has not yet achieved consensus regarding its scientific nature, its application is understood to be an art hence it exhibits the initial requirements needed for its practice to become relevant in project-based work. More research is however needed to elaborate on how value can be achieved in practice, and how project performance compares whilst using, or not, Foresight tools.

Elaborating on this view, it is nonetheless essential to stress the importance of project context and time horizon in applying different tools from Foresight. Hence, for instance, while the identification of early warning indicators can occur at any point in the project regardless of its duration, it might be costly and ineffective to conduct scenario planning workshops in a three-month duration project. On the other hand, due to the horizon timeframe involved, scenario panning work might prove beneficial is used in the context of megaprojects, which tend to encompass several years, as have an additional layer of complexity and uncertainty involved. The same logic can thus be applied to projects, programs and portfolios, where the timeframe can dictate the usefulness of the Foresight toolkit. By its long-term nature it is expected that portfolio management can benefit the most from Foresight capabilities. Also, following the same rationale, the legacy of project, which is oriented towards the future and intended for the long-term, might benefit strongly from using Foresight as a future-proof tool.

5. Conclusion

The review demonstrates that Foresight research in Project Management literature is still in its infancy, and thus is characterized by a limited number of studies and a relative absence of theoretically informed research. Based on the reduced number of studies identified, it is reasonable to conclude that data on the relationship between Project Management and Foresight is loose and not yet robust, strongly indicating an open path for future research.

Results reached entangle significant implications to managers as they are now required to assess the match between the external and internal environment of the project, the several scenarios that may unfold and the internal capabilities of the project team to cope with these scenarios, and the different expectations about the future and how ready is the project organization for it. The future is more uncertain than ever and companies can no longer afford to ignore it. Moreover, traditional practices and tools in Project Management keep being challenged and prove not to be sufficient to cope with increasing complexity and uncertainty. In light of this prospect and based on conclusions reached through this review, while the application of Foresight in projects has limitations that need to be acknowledged, Foresight appears hence as an emergent practice whose use and effectiveness are worth considering in the context of project, program and portfolio management.

In regards to limitations, the author acknowledges publication bias as well as a potential bias in the screening and selection conducted as it was done by a single individual in isolation. Despite this fact, this research starts the conversation on an integrative view of Foresight in the light of projects and findings from this research open new paths of enquiry related to differences and particularities of application of Foresight in the domains of projects, programs, and portfolios. Further investigation is now required to fully understand how Foresight can be used in

practice to aid the management of projects. Recommendations for research also include exploring the link of Foresight with project complexity, and how it applies to projects in different industries as well as to what extent different countries are prone to use Foresight according to their score in the cultural dimension of “uncertainty avoidance” as defined in Hofstede’s²² model.

References

1. B. J. Oates, G. Capper, Using systematic reviews and evidence-based software engineering with masters students, in: *EASE*, Vol. 9, 2009, pp.20–21.
2. Cooper, H. M. (1984). *The integrative research review: a systematic approach*. Sage Publications, Beverley Hills, CA.
3. B. A. Kitchenham, T. Dyba, and M. Jorgensen. (2004). Evidence-based software engineering. In *Software Engineering. ICSE 2004. Proceedings.26th International Conference on. IEEE*, 2004, pp. 273–281.
4. Nikander, I. O., & Eloranta, E. (2001). Project management by early warnings. *International Journal of Project Management*, 19(7), 385-399.
5. Williams, T., Jonny Klakegg, O., Walker, D. H., Andersen, B., & Morten Magnussen, O. (2012). Identifying and acting on early warning signs in complex projects. *Project Management Journal*, 43(2), 37-53.
6. Dye, L. D. (2002). Using scenario planning as an aid in project portfolio management. In *PMI Global Congress North America* (pp. 3-10). Project Management Institute
7. San José, J. C., (2012). The Future of Project and Program Management--Foresight Workshop. Project Management Institute
8. Craddock, T.W. (2009). What are the roles of scenario planning in Project Management?. *PMI Global Congress—EMEA*. Project Management Institute
9. Russell, L. (1998). I Wish I'd Known: Scenario Planning to Jump Start a Project. *Proceedings- Project Management Institute; Tides of change '98*; pp. 241-246. Project Management Institute
10. Hazır, Ö. (2014). A review of analytical models, approaches and decision support tools in project monitoring and control. *International Journal of Project Management*.
11. Haji-Kazemi, S., Andersen, B., & Klakegg, O. J. (2015). Barriers against effective responses to early warning signs in projects. *International Journal of Project Management*.
12. Haji - Kazemi, S., Andersen, B., & Krane, H. P. (2013). A Review on Possible Approaches for Detecting Early Warning Signs in Projects. *Project Management Journal*, 44(5), 55-69.
13. Nikander, I. O., & Eloranta, E. (1997). Preliminary signals and early warnings in industrial investment projects. *International Journal of Project Management*, 15(6), 371-376.
14. Ferraro, J. (2014). Five competencies to successfully drive strategic initiatives. *PMI Global Congress Proceedings*. Project Management Institute.
15. Sánchez, A. M., and Pérez, M. P. (2004). Early Warning Signals for R&D Projects: An Empirical Study. *Project Management Journal*, 35(1), pp. 11-23.
16. Williams, T., Klakegg, O., Andersen, B., Walker, D., Magnussen, O., & Onsoyen, L. (2010). Early warning signs in complex projects. In *PMI Research and Education Conference* (pp. 1-28). Project Management Institute.
17. Haji-Kazemi, Sara; Andersen, Bjørn; Krane, Hans Petter. (2012). A Conceptual Framework for Application of Performance Measurement as an Early Warning System in Projects, an Analysis on the Case of the London Ambulance Service Project. *PMI Research and Education Conference 2012*. Project Management Institute
18. Haji-Kazemi, S., & Andersen, B. (2013). Application of performance measurement as an early warning system: A case study in the oil and gas industry. *International Journal of Managing Projects in Business*, 6(4), 714-738.
19. Haji-Kazemi, S., & Andersen, B. (2014). Efficiency of project health checks (PHCs) as an early warning system in practice: A case study in Norway's telecommunication industry. *International Journal of Managing Projects in Business*, 7(4), 678-700.
20. Stare, A. (2013). Agile project management—a future approach to the management of projects. *Dynamic Relationships Management Journal*, 2(1).
21. Chugh, R. (2011). Analysis of Project Management in Theory and Real World: An Information System Case. In *IEEE International Conference on Information Management and Engineering (ICIME2011)*, Zhengzhou, China, May 21-22, 2011
22. Geert H. Hofstede. (2001). *Culture's consequences: Comparing values, behaviours, institutions and organizations across nations*. Geert Hofstede (Ed.). Sage.