KEYWORDS ■ end of life aircraft recycling projects ■ green image of manufacturers ■ sustainable development objectives

THE CRITICAL SUCCESS FACTORS FOR END OF LIFE AIRCRAFT TREATMENT PROJECTS

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ABSTRACT

EOL aircraft recycling projects have been receiving lots of attention in aviation industry considering the green image of manufacturers and the sustainable development objectives. Despite the large amount of investment in these projects, there is still a lack of research on how it should be accomplished to be successful. Therefore, the purpose of this paper is to derive critical success factors for the successful implementation of EOL aircraft recycling project. We hypothesize that there are certain factors in different phases of the life cycle of the projects that positively impact their success. A spiral model is used to consider project lifecycle phases, the role of key stakeholders and the influential factors in different phases. This research seems to be the first practical study on the management issues of EOL aircraft recycling projects.

INTRODUCTION

The number of aircrafts at the end of life *(EOL)* is continuously increasing. Dealing with retired aircrafts considering the environmental, social and economic impacts is becoming an emerging problem in the aviation industry in near future. Aircraft original manufacturers have an extensive background of looking for solutions to reuse or recycle aircrafts and their components. The two largest airframe manufacturers, Airbus and Boeing, are at the head of research and main projects in this field. In 2005, Airbus initiated a project in order to achieve new eco-efficient standards for the management of EOL aircrafts. Boeing has taken a leadership role in aircraft life cycle and end-of-service recycling strategies and established a consortium to provide environmentally responsible options for aging aircrafts in 2006. In 2012, Bombardier continued its partnership with the Consortium for Research and Innovation in Aerospace in Quebec, as well as the other research centers and universities to better understand end-of-life requirements and commercially practical recycling technologies for aircrafts. The goal of such efforts is to develop methods and test them to perform profitable recycling processes for EOL aircrafts, minimize the environmental impacts of the whole treatment process and maximize economics and social values for the involved stakeholders. Considering, dynamics and multidimensionality of aircraft recycling projects, conventional management systems cannot be sufficient and responsive.

There are some major challenges in addressing EOL aircraft problem including the absence of relevant directives in the aviation industry, size of treated materials from EOL aircrafts, the complexity and challenges in fleet recycling process and the multilayered relationship among players. The other challenge is the sustainability of the whole value chain considering all involved stakeholders. Furthermore, considering the essential role of aircraft manufacturers and their inclusive attention to corporate social responsibility, the green strategies need to be incorporated into the design stage. EOL aircraft recycling management covers not only technical specifics, but it also requires an integrated strategic approach which cover sustainability and value creation concepts at the same time. This paper aims to address the success factors in EOL aircraft recycling projects. Typically, cost, time and quality are the criterion for measuring the project success. However, in the complex and dynamic context such as aerospace industry, a novel framework is needed to formulate the success in the pre-implementation and implementation phases. Moreover, a few empirical studies have been conducted in diverse industrial environment that support the inclusion of stakeholders' views in determining the project success. This paper aims to address the critical success factors of these projects through their life cycle. A spiral model and four propositions are proposed to address the link between the external/internal factors and project success. A framework for empirical study is also provided. The rest of this paper is organized as follows: in part 1, a review of EOL aircraft recycling projects is provided. In part 2, the literature review on critical success factors of the projects is explained. In addition, the main differences between EOL recycling project and other types of the projects are demonstrated in order to shed light to the nature of these projects. Part 3 introduces a conceptual model and propositions. In part 7, a framework for the empirical survey and data analysis are presented and finally, part 8 provides the discussions and the main conclusions of the study.

1. EOL aircraft recycling projects

EOL aircraft recycling

More than thousands of aircrafts will be retired in the next 2 decades. The recycling of these aircrafts provides several opportunities for aerospace business. Moreover, considering the increasing focus of aerospace community on environmental issues and landfill regulation, owners seek for efficient, economically and environmentally-sound methods for EOL aircrafts *(AFRA web site)*. From the aircraft manufacturer's perspective, the green image related to treatment of aircrafts at the end of life based on environmental concerns shifted gradually as a competitive advantage in the global market *(Siles, 2011)*. EOL aircraft recycling can provide several business benefits. Regardless of the resale of the aircraft's reusable parts, it is possible to make money from the recycling of materials. Furthermore, the reduction of the environmental impact of a retired fleet through recycling process has an important role for all actors in operation processes of recycling the EOL aircrafts. Moreover, such approach can ensure long term social benefits. Indeed, the development of this sector and having an infrastructure for recycling can lead to many

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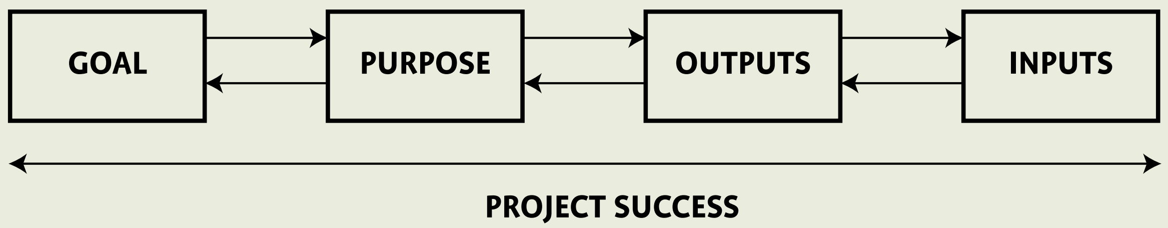

FIGURE 1. *Logical framework method for project objectives (adapted from Baccearini, 1999)*

Project	PAMELA	ENV-412
Goal	Eco efficiency in aircraft life cycle	Corporate social responsibility and design for environment
Purpose	Setting new eco-efficient standards for the management of the end-of-life aircraft	Developing general methods and test them on an experimental platform to dispose of and/or implement recycling processes and dedicated infrastructure for end-of-life aircraft and helicopters
Outputs	First full-scale demonstration project and has identified a generic methodology for handling all end-of-life aircraft, along with a set of best practices	Optimizing recycling process Provide accurate information on the end-of-life of aircraft Implementing recycling processes lessons learned for future design
Inputs	Resources and work	Resources and work

TABLE 1. *Two EOL recycling projects based on LFM approach*

lasting jobs opportunities, which are the factors of social and local development *(Sainte-Beuve, 2012).* Developing new strategies for dismantling and decision support relating to design and management of EOL aircraft treatment in uncertain business environment needs to be taken into account. The efficiency of the treatment operation can be measured by its efficiency in creating value for all stakeholders involved in the problem.

Projects

According to Keivanpour et al., *(2013, 2014- a, b),* original manufacturers have a long history of looking for ways to reuse or recycle aircrafts and their components. In the past, at least 50 percent of the material used in aircraft construction was reused or recovered. The two largest airframe manufacturers, Airbus and Boeing, are at the head of research and main projects in this field. ". Airbus initiated a PAMELA project with recycling and recovery rate by 85 percent of the aircraft weight. Boeing has taken a leadership role in aircraft life cycle and end-of-service recycling strategies for more than 50 years. Aircraft Fleet Recycling Association, AFRA, is a global consortium of more than 40 companies that provide environmentally responsible options for aging aircrafts *(Watson, 2009).* These options include maintaining and reselling reliable airplanes and returning them to service. Safe parts recovery scrapping and recycling services are available for airplanes that cannot be returned to service *(Boeing 2010 Environment Report).* Bombardier is also working on recycling challenges. In 2012, this company continued its partnership with the Consortium for Research and Innovation in Aerospace in Quebec *(CRIAQ)*, as well as the other research centers and universities to better understand end-of-life requirements and commercially practical recycling technologies for aircraft *(Bombardier Website).* In this part, the characteristics of two projects *(PAMELA and CRIAQ ENV-412)* are presented with more details. The first main project was introduced by Airbus in 2005. PAMELA *(Process for Advanced Management of End-of-Life Aircraft)* was a two year project that focused on dismantling an A300B4. During this project, the effectiveness of different techniques was assessed *(Aircraft Technology; PAMELA).* The project was a partnership between Airbus and Suez-Sita, EADS CCR, EADS-Sogerma Services and the Hautes Pyrénées Prefecture. The estimated budget of the project was 3.24M€ and the duration of the project was 2 years *(PAMELA).* The second project, Process for Advanced Management and Technologies of Aircraft End of Life" CRIAQ ENV-412, was initiated in 2012. The project involved the dismantling of CRJ100/200 aircraft at the Centre Technologique en Aérospatiale *(CTA)* in Quebec, Canada. The duration of the project was 3 years and its budget estimated to be 1.4M$. Bombardier, BHTC, CRIAQ, Aluminerie, Alouette, Sotrem-Maltech, BFI, NanoQuebec, MITACS and four universities have contributed to the project *(Bombardier report).* Baccearini *(1999)* proposed the logical framework method *(LFM)* in order to provide a common understanding of overall project scope for all project participants. In this approach a hierarchy of project objectives shows the linkage between different levels of the project objectives. The author believes that this framework is valuable for addressing the concept of project management success *(see* **Figure 2***).* Based on this approach, the different features of these two projects are illustrated in **Table 1**.

2. Critical success factors of the projects

Literature review

The success of implementing any complex system requires identifying factors that promote the effective operation via the life cycle of the system *(Chou & Chang, 2008; Klein & Martz, 2003; Tsai et al., 2011).* Moreover, the stakeholders play the critical role in order to implement any project successfully *(Soh et al., 2000).* The different facilitators have an influence on the projects' deployment. Investigation of these factors is needed to better understand the involved parameters in the projects' implementation process. The literature on success factors of projects is quite vast. In recent years, this topic has received much attention from researchers and practitioners. In this section, we have an overview of the studies that address success factors of projects. **Table 2** shows some of these works.

What is different in the case of EOL aircraft recycling projects?

In this part, we review some specific features of EOL aircraft recycling project that differentiates it from other projects. The context of the project, level and the type of complexity of the project could influence the critical success factors. There are several studies that address the complexity of projects index. Raz et al. *(2002)* defined the complexity based on uncertainty, complexity of scope and criticality of time goals. Saynisch *(2010)* makes distinction between project complexity and environmental complexity. The size of the project, number of stakeholders, location and the type of contract are the characteristics mentioned by Turner and Muller *(2006)* as project complexity. Muler et al. *(2012)* summarized the features of complexities across different references and mentioned three types of complexity: complexity of faith that relates to the novelty of the problem and its uncertainty; complexity of fact which addresses the structural complexity and the vast amount of interdependent information and complexity of interaction that presents the conflicts of the involved stakeholders and the interaction among them. Hussein et al. *(2014)* surveyed the complexities in new product development projects. They mentioned diversity, uncertainty, interdependency, task ambiguity and novelty as the sources of complexities in the projects. Botchkarev & Finnigan *(2014)* presented a systematic approach to complexity in project management and addressed the different attributes of the complexity in different projects such as IT or engineering project. Hence, the literature on complexity is extensively broad and covers different types of attributes. In this part, the different characteristics of EOL aircraft recycling project are considered to reflect the complexity of these projects. From a structural point of view, the different task functions in the project including disassembly, dismantling, logistics; network design, material recycling and life cycle assessment as well as the multidisciplinary nature of the project with different disciplines such as mechanical, industrial, material and aerospace engineering and management in addition to the different required databases infrastructure for different sub processes of EOL aircraft treatment could be mentioned. From technology novelty, the novelty of different technologies for material recovery and composite recycling, sorting and disassembling techniques could be considered as complexity attributes. The challenges of project management including the complexity of functional tasks, the uncertainty and ambiguity of tasks and lack of robustness in project elements are also other complexity features in these projects. The diversity of different stakeholders involved in the project, their expectations and the interaction among them are the other characteristics that makes the project complex.

3. The proposed spiral model

We proposed a fresh spiral model for addressing the critical success factors of the project through the life cycle *(***Figure 2***).* The circular dimension shows the increasing cost incurred in performing the different steps of the project in the performance measurement framework. The angular dimension represents the development of each cycle of the spiral that leads to project deliverables in the framework of the stakeholder's commitment. The related tasks of the project in each cycle and the critical success factors are shown in **Table 3**.

Measuring the success of the projects is extensively known by practitioners and academics as a difficult concept.

User satisfaction is a common indicator of system success. The questionnaires for stakeholders to express their view regarding project could be a measure for project success *(e.g., Guinan et al. 1998)*. Hence, we can classify the measures in three categories; project management success factor such as meeting the time, budget and project specification *(Shenhar et al., 2001)* performance improvement which includes the process improvement and technology development and finally the satisfaction *(including partners satisfactions and all other stakeholders involved in the project's life cycle)*.

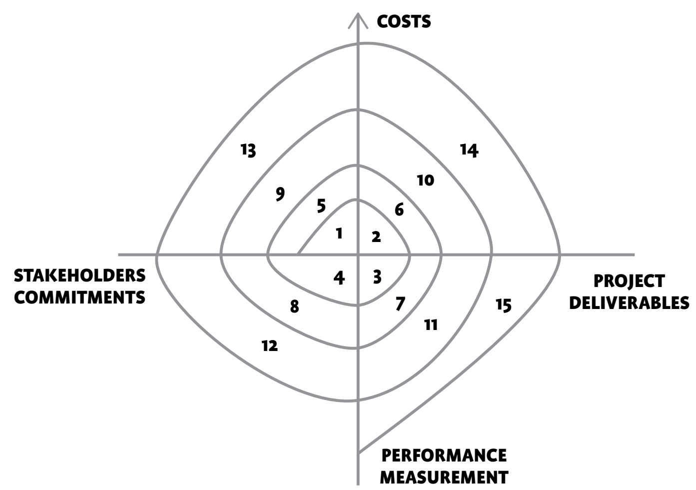

FIGURE 2. *Spiral Model for representing critical success factors through project life cycle*

4. Hypothesis development

With this model, we find the relationships among the identified success factors extracted from a literature review and their impacts on the different phases of the projects. Furthermore, the importance of the different project phases on project success indicators could be revealed. According to Ahern et al., *(2014, p.1371)*, complex project management can be considered as a form of complex problem solving due to the governance challenge of knowledge management under uncertainty. This study cited the characteristics of the complex problem from the earlier literature *(Weinberg 2001; Snowden 2002; Cleden 2009 and Swinth 1971)*. These features could be revealed in EOL recycling projects too. The solutions for the EOL recycling problem must serve different stakeholders. Different functional teams involved in ENV-412 project including academics and industrial teams. Each of these partners had a specific goal in the project considering their organizational mission. Moreover, there is a high degree of correlation between different sub-tasks. One academic team may be formed by the participation of the different universities and research centers due to task complexity. For example, new recycling technology requires the involvement of different experts and researchers to maximize the performance of the project's outcomes. The novelty of the problem and challenges such as integrating the design for recy-

NO	Authors and year of publication	Sources	Critical success factors	Type of the projects under study
1	Belassi, & Tukel, (1996)	International journal of project management	Project factors; Management and teams factors; Organization factors; External environment factors	Construction ;Management Information systems; Defense ;Manufacturing Environmental; And others(including educational, HealthCare and pharmaceutical)
2	Ihuah et al.,(2014)	International Journal of Sustainable Built Environment	The project managers' performance; The characteristics of the team members; and the external project environment; Stakeholders supports	Sustainable social (public) housing estates' delivery/provision
3	Gudien a, et al.,(2013)	Procedia Engineering	External factors; Institutional factors; Project related factors; Project management and members factors; Project managers factors;Client factors; Contractors factors	Construction Projects
4	Wang & Huang,(2006)	International Journal of Project Management	key stakeholders_ project performance; project management organizations_ performance	Construction Projects
5	M¨uller et al.,2012	IEEE Transactions On Engineering Management	Leadership; emotional (EQ), intellectual (IQ), and managerial (MQ); leadership competences	Engineering, IT, combined Engineering and IT; Complex projects
6	Lindner & Wald 2011	International Journal of Project Management	Knowledge management including (Culture & Leadership; Organization & Processes; ICT-systems)	Different projects ;IT/software ;Automotive ;Plant construction ; Manufacturing ; Consulting ; Public enterprises ;Transportation/logistics ;Other services ; Construction ;Pharmaceutical/chemical ;Financial services ;Telecommunication
7	Goo Hong et al.,(2012)	International Journal of Advancements in Computing Technology	User's active participation; CEO's active interest and support; Appropriate policy support of the Government; Continuous communication with related organizations; Application of feasible technology; Securing User's ability to utilize the system	Radio Frequency Identification/Ubiquitous Sensor Network
8	Pisarski et al.,(2011)	25th Annual Australian and New Zealand Academy of Management Conference	Project leader characteristics; Team leader characteristics	Complex projects

TABLE 2. *Review in the literature*

Phase	AREA	Task	Critical success factors
Start- up	1	Defining the Goal and purpose of the project based on the key stakeholder's Interest	Key stakeholders involvement ; Objectives definition
	2	Preparing the scope of work (The draft of agreement) including estimated budget and schedule	
	3	Defining the project outcomes and perspective of the deliverables	
	4	Preparing the preliminary framework for evaluation and project management process	
Planning	5	Forming the team of the project	Key stakeholders involvement ; Objectives definition
	6	Finalizing the scope of the work, budget and schedule and preparing final agreement	
	7	The approval of the project	
	8	Finalizing the performance measurement framework and communication plan	
Execution	9	Production of the key deliverables	Knowledge management ; key stakeholders involvement; communications and coordination mechanism
	10	Project management (Monitoring time, budget and quality)	
	11	Controlling the challenges and changes	
	12	Reporting and communication	
Close- out	13	Contract close out and celebration	Stakeholder's expectations; Deliverables reporting
	14	Team feed backs and reporting	
	15	Post implementation review and recommendation for future	

TABLE 3. *The related areas, tasks and success factors in each cycle of the spiral model*

cling in the early stage of aircraft design process needs combining existing ideas and techniques in a fresh way. If we look at the logistics network of EOL aircraft recycling, the complexity of this network could be more than the complexity of supply chains and logistics networks. Choi & Krause, *(2006)* introduced "complexity" as a key area of managerial consideration in supply chain analysis. Based on the concept of complexity, the authors defined the complexity in supply chain analysis as a factor of the number of suppliers in supply base, the level of interaction among them and the degree of variation between these suppliers in terms of technology, size or organizational culture. Hence, the number of suppliers, their variations and the level of interaction make the operational load for focal company in supply chain management. They analyzed this complexity by defining a supply base which includes the different suppliers and their interactions. In the analysis of EOL aircraft treatment value chain, we are faced with three bases: process base, performance base and stakeholder's base *(**Figure 3**)*. If we define the complexity in each base *(level)* as a factor of number of elements, their interaction and the diversity among them, then the total complexity will be the function of these three levels of complexity. There are different sub-processes in the treatment of EOL aircraft. The relations among these processes and the diversity of these sub-processes in terms of the technology, required human resources, the challenges of implementations, and the geographical location and so on form the first level complexity. The second level of complexity encompasses the sustainability, efficiency and effectiveness of this process. The number of aspects in this level *(economic, social and environmental level)*, the trade-off among these different aspects and the diversity of these criteria form the second level complexity. The third level includes the different players involved in this problem. The number of players, the interaction among them and their diversity in terms of size, the influence, type of organization and so on form the third level complexity. Therefore, the total complexity in this problem is the interaction of three level complexities.

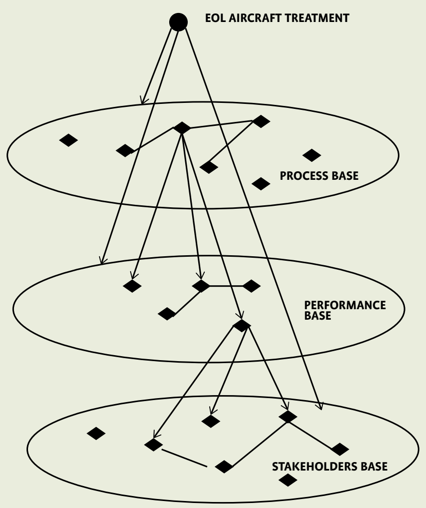

FIGURE 3. *The complexity in EOL Aircraft treatment (Keivanpour, 2014-b*

In the following sub sections, we discuss the essential aspects of the EOL recycling project in order to develop the hypothesis.

5. The objectives of the projects & key stakeholders involvement

As mentioned before, the general purpose of the project is developing general methods to implement recycling processes for end-of-life aircrafts. This general goal requires several tasks and considering the different tasks, the involvement of appropriate partners is essential. The first objective regards conducting subassembly studies in order to perform the disassembling process. This step contains the decommissioning of the aircraft and passing several steps aligned with related regulations such as air worthiness certificate, etc. After the drainage, the next step is removal of the main equipment such as engines, landing gear, electronic, interior to deliver an empty airframe for the dismantling step. Dismantling process includes finding the best methods and technologies to detach the main part of the air frame in different sections *(for example wings from fuselage)*. Then each part should be divided into smaller parts and sorted by material types to be prepared for recycling and recovery process. The logistics network of the recovery process and value chain analysis should also be studied. Considering these three steps, several universities and research teams with expertise in aircraft assembling and disassembling, maintenance and logistics should be involved in the project.

One of the main challenges in retired aircraft recycling is aluminum recovery considering the level of residual impurities found in the recycled metal. Hence, participation of the industrial and academic partners in materials and chemical engineering, logistic, economic and environment issues in re-using of materials is critical. All the knowledge achieved in these processes could be integrated in the design phase of new aircraft manufacturing in order to reduce difficulties to disassemble, to recycle and reduce the environmental footprint of this economic activity. The involvement of aircraft manufacturers such as the key stakeholder is also crucial to maximize the long term sustainable outcomes of the project. Based on Ahern et al., *(2014, p.1377)*, "Fostering a common will around a challenging mutual goal and pacing this common will towards achieving the mutual objective are two separate but crucial ingredients for overall project success in complex organisational settings". Moreover, typically the solution must serve a variety of objectives.

In the majority of cases in sub tasks, there is no clear vision about the objectives. The ambiguity in the objectives in the planning phase is more likely to have a set of flow objectives that could be transferred to the itemized parts during the life cycle of the project *(**Figure 4**)*.

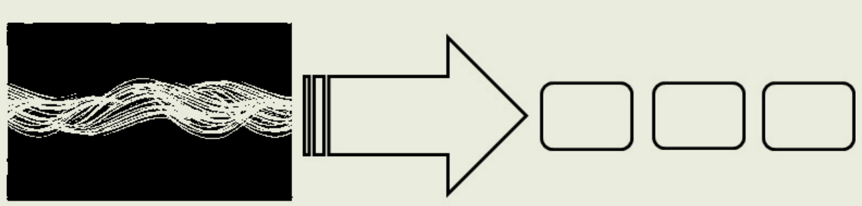

FIGURE 4. *The nature of the objective in complex projects (transition from flow to itemized parts)*

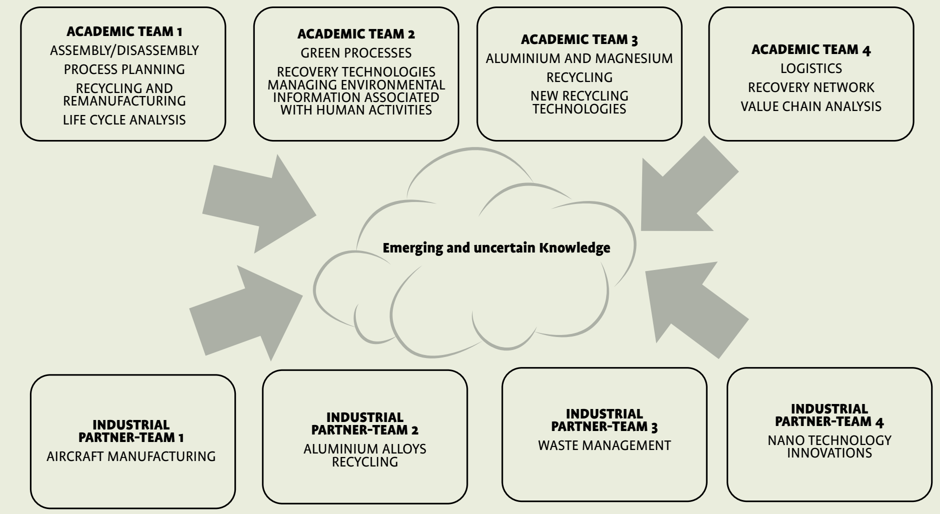

FIGURE 5. *The variety of functional teams in EOL aircraft recycling project and emerging knowledge*

6. Knowledge management & communication challenge

The formation of new knowledge and the effective coordination are the main aspects for governance in complex project management. According to *(Cleden 2009, cited in Ahern et al., (2014)*; there is the 'four quadrants' approach to project uncertainty: 'known knowns' *(knowledge)*, 'known unknowns' *(risks)*, 'unknown knowns' *(untapped knowledge)*, and 'unknown unknowns' *(uncertainty)*. The uncertainty and emergent nature of knowledge in the EOL aircraft recycling project makes it as a complex problem solving environment. **Figure 5** shows the different functional teams in the project and the uncertain nature of the knowledge from a variety of disciplines.

Now, the question is how can this complex setting and unclear objectives lead to the specific deliverables for the players?

Learning the project is the answer to the question, which includes the project functional teams, as a community of learners, developing the knowledge over the project life cycle with a problem solving approach *(Polanyi, 1967)*. Another challenge is the governance of these different teams. Communication and coordination between academics and practitioners with different levels of expertise and tacit knowledge in a way to have a joint governance organization *(**Figure 6**)* is a complex task *(Czarniawska-Joerges, 1989, 1992; Polanyi, 1969)*. Ahern et al., *(2014)* introduced a new term for the coordination of emergent knowledge in complex project setup, "common will of mutual interest". This term aids to highlight the role of stakeholder's expectations and translation of the outcomes and deliverables of the projects to common outset to facilitate the governance and sustain the success.

Based on the above discussions, we propose the following hypotheses:

- H1: The key stakeholder's involvement and clear objectives definition are the critical success factors of EOL project that positively affect the start-up and planning phases of the project.
- H2: The knowledge management; key stakeholders involvement; communications and coordination mechanism are the critical success factors of EOL project that positively affect the execution phase of the project.
- H3: The stakeholder's expectations and deliverables reporting are the critical success factors of EOL project that positively affect close-out phase of the project.

7. Proposed framework for empirical study

From the literature review, a list of success factors is obtained. This review helps to find similarities and dissimilarities between the project under study and other project management contexts. The objective of the literature review is to develop a framework for the survey and to prepare the questionnaire. All success factors will be considered to be able to measure the related attributes. The preliminary draft of the questionnaire will be sent to the key members of the project in order to prepare the main research questionnaire. A preliminary draft of the questionnaire is provided in Appendix A. There are different mechanisms for communication in the complex projects. The meetings, steering committees and regular reporting are the common ways for communication and strategic decision making in the projects. For example, in ENV-412 there are two types of meetings; technical meetings and general meetings. The technical meetings are held with the participation of the researchers and graduate students in order to discuss different technical issues in the project. In the technical meetings, the agenda, reports and presentations for general meetings will be prepared. In the general meetings, the key stakeholders and industrial partners are participating. Hence, the strategic decisions regarding the next steps of the projects will be made. The members of technical meetings and general meetings could participate in the survey in order to evaluate the hypotheses. The respondents could be requested to rate the questions according to a five point Likert scale *(1=very low and 5=very high)*, based on their actual hands-on experience on the project. The different statistical methods, such as multiple regression or factor analysis could be used to analyze the data and the questionnaire. Multiple Regression model is a mathematical model that can relate a number of independent variables to a dependent variable. Therefore, this technique could be selected to find the critical success factors through the life cycle of the project.

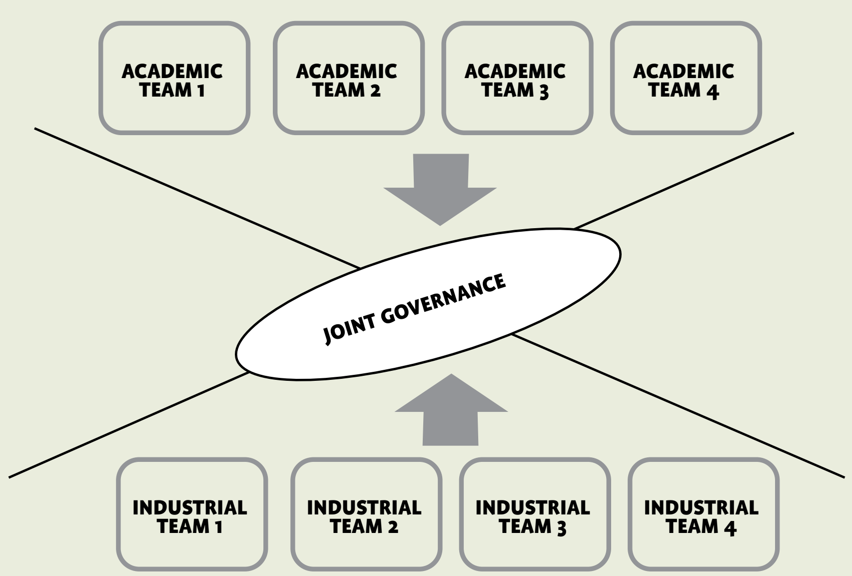

FIGURE 6. *Joint governance in emerging knowledge environment*

8. Conclusion & practical application

This paper discusses the internal/external factors that lead to the success of EOL aircraft recycling projects. It provided a comprehensive perspective to the successful implementation of these projects. We surveyed the current literature on critical success factors of the projects. We proposed a conceptual framework and formulated propositions for strategic factors related to the performance of these projects. An evaluation of the critical success factors of EOL aircraft projects, based on bringing together the views of different stakeholders involved, leads to better outcomes and understanding about the problem. The improved understanding could create essential strategies to lessen the associated risks and unproductive management. It could result in considerable performance improvements in project management features and knowledge management. It could also help to design an effective performance measurement framework. Identifying critical success factors in each cycle of the project could transform the project as the best practices for future experiences. As the EOL aircraft recycling is a novel and emerging problem, accomplishing a successful project can lead to certain practices for practitioners, particularly for industrial partners. The deliverables of such project could be integrated in the design phase of the manufacturing process in order to produce long term sustainable outcomes. It could bring insights for key stakeholders to identify the critical dimension of the projects, which leads to an effective and efficient cooperation.

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Appendix A: Questionnaire

No	Questions	Rate				
		Very Low	Low	Moderate	high	Very high
1	How do you rate the effect of key stakeholder's involvement in start-up phase on project success?					
2	How do you rate the effect of key stakeholder's involvement in planning phase on project success?					
3	How do you rate the effect of key stakeholder's involvement in execution phase on project success?					
4	How do you rate the effect of key stakeholder's involvement in close-out phase on project success?					
5	How do you rate the effect of objectives definition in start-up phase on project success?					
6	How do you rate the effect of objectives definition in planning phase on project success?					
7	How do you rate the effect of knowledge management in start-up phase on project success?					
8	How do you rate the effect of communication and coordination in start-up phase on project success?					
9	How do you rate the effect of knowledge management in planning phase on project success?					
10	How do you rate the effect of communication and coordination in planning phase on project success?					
11	How do you rate the effect of knowledge management in execution phase on project success?					
12	How do you rate the effect of communication and coordination in execution phase on project success?					
13	How do you rate the effect of knowledge management in close-out phase on project success?					
14	How do you rate the effect of communication and coordination in close-out phase on project success?					
15	How do you rate the effect of stakeholder's expectation in planning phase on project success?					
16	How do you rate the effect of stakeholder's expectation in execution phase on project success?					
17	How do you rate the effect of deliverables reporting in execution phase on project success?					
18	How do you rate the effect of stakeholder's expectation in close-out phase on project success?					
19	How do you rate the effect of deliverable reporting in close-out phase on project success?					
20	Please indicate any other factors that you think are critical in ENV 412 project success					
21	If any question doesn't have enough clarity, comprehensiveness and completeness, please specify here.					
22	Other comments:					

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