

A bibliometric analysis of the fuzzy front-end of innovation using the HistCite software

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Abstract: The number of academic papers addressing the fuzzy front-end (FFE) of innovation has increased over the last years, confirming the importance of this research field. This paper presents the outcomes of a bibliometric analysis of the literature related to FFE that was published between 1985 and 2013. The HistCite software was the tool used to implement the analysis. The results show the number of papers published per year, the most important journals, and the most cited papers. Most of the studies reviewed in this article applied empirical research methods, and the number of research topics have increased in this period. This study provides a preliminary bibliometric and thematic analysis of the FFE literature, identifying research perspectives.

Keywords: front-end, innovation, bibliometric, literature review.

1. Introduction

The fuzzy front end (FFE) of innovation embraces the early stages of the innovation process. Its activities lie between the idea generation and the decision regarding the development or termination of a product proposal (COOPER, 1988). According to Khurana and Rosenthal (1997), the FFE includes: the formulation of a new product strategy, opportunity identification, generation and screening of ideas, product definition and project planning.

Several authors have discussed the importance of the FFE (KHURANA; ROSENTHAL, 1998; KIM; WILEMON, 2002; BACKMAN; BORJESSON; SETTERBERG, 2007; VERWORN; HERSTATT; NAGAHIRA, 2008; MARKHAM, 2013). They have claimed these early stages as being the primary opportunity to enhance innovation outcomes. Moreover, the FFE requires often less effort to reduce time, resources and costs if compared to the other innovation stages.

In spite of being an opportunity for improvement, the execution and management of FFE is complex and unclear. Khurana and Rosenthal (1998), Koen et al. (2002) and Markham et al. (2010) described the FFE as a path of complex information processing, tacit knowledge, conflicting organizational roles and uncertainty. According to them, the development of knowledge that suits to the specific FFE characteristics and requirements is required to overcome these issues.

The number of academic papers addressing the FFE has increased over the last years, confirming the importance of this research field. However, the studies developed

seem to lack alignment, leading to poor achievements in new theory building. This fact indicates the need of a better understanding of the research field, supporting the establishment of more appropriate research lines.

A first step toward the understanding of the FFE research field consists of performing a comprehensive analysis of the state of the art. Some attempts have been done in this sense, however they tend to focus on specific topics and, therefore, provide restricted guidance (KIM; WILEMON, 2002; CHANG; CHEN; WEY, 2007). Concerning the entire research field, no attempt aiming at clarifying it has been found during the development of this study.

To tackle issue, this paper presents a bibliometric analysis of the research field of the fuzzy front end of innovation. As a result, an overview of the state of the art is provided as well as some directions for future research.

The following section describes the research method followed in the study. Then, the results of the bibliometric analysis are presented and discussed. Finally, conclusions are drawn and future research is suggested.

2. Research method

This paper represents a systematic literature review of the front end of innovation. Cook, Mulrow and Haynes (1997) argue that the systematic literature review employs research methods with greater scientific rigor. Therefore, it is likewise to achieve better results, since minimizes errors and bias in the research process. Bibliometrics is a core part of systematic reviews, providing information about

the state of the art through the investigation of the scientific production. Scientific databases are the main source of data, being used to establish indicators through the application of quantitative techniques (OKUBO, 1997).

Bibliometrics refers to the mathematical and statistical analysis of the publication data, for example: the most important academic papers and the main authors and journals based on a citation analysis (OKUBO, 1997). It can also include content analysis, since it allows the identification of the most important research topics, approaches and methods (RAMOS-RODRÍGUEZ; RUÍZ-NAVARRO, 2004).

The systematic literature review conducted in this study selected the Web of Science® database as the source of data. This database embraces an extensive collection of journals within the FFE research field as well as it provides the metadata required to load the HistCite®, the bibliometric tool chosen for this study. There are other bibliometric studies which have focused on the Web Science® database (CARVALHO; FLEURY; LOPES, 2013).

The following keywords were selected to search the initial sample: “front end”, “predevelopment” and “pre development”. In addition, the sample was restricted to papers of journal published between 1985 and 2013 and classified within the categories: business, management, industrial engineering, operation research/management science. As a result, a total of 333 papers were identified.

Afterwards, abstracts were read and assessed, aiming at removing papers whose subject did not fit to the study. At this point, the screening process involved two researchers, working in parallel and comparing their judgments. Then, 217 were excluded, leading to a final sample of 116 papers. The list containing these papers is presented in Appendix 1.

The HistCite® bibliometric tool was chosen to support the bibliometric analysis. This tool provides a set of predefined analysis, which was carried out to explore the final sample: number of papers published per year; the most important journals, the most cited authors and institutions; the most cited papers; citation network; the most cited references and the most used words in titles and keyword.

At the end, a content analysis was undertaken to extract information concerning research methods and research lines addressed in the FFE research field. In this sense, the content of papers was analysed by the researchers and

data were collected, grouped and classified according to a classification scheme proposed in this study. Content analysis method has also been used to underpin other literature reviews (CARVALHO; FLEURY; LOPES, 2013). Table 1 shows the proposed classification scheme.

The first part of the classification scheme follows the Papastathopoulou and Hultink (2012) approach, in which research methods are classified in conceptual and empirical. The conceptual comprises literature reviews, theoretical models, frameworks, quasi-experiment and simulations. The empirical includes surveys, case studies and action researches. The second part of the scheme deals with research lines. At this point, the proposal was developed through a bottom-up approach, in which research topics were gathered and grouped, leading to major categories, i.e., research lines. The next section presents the results of the bibliometric analysis.

3. Bibliometric analysis

As aforementioned, the bibliometric analysis was performed through the application of the HistCite® software. The sample is comprised of 116 journal papers collected from the Web of Science® database and described in Appendix 1. The following metrics were developed:

- number of papers published per year
- the most important journals, authors and institutions
- the most cited papers
- the citation network
- the most cited references
- the most used words in titles and keywords

These metrics are presented and discussed throughout this section.

3.1. Number of papers published per year

This study considered papers published between 1985 and 2013, which means a time span of 28 years. Figure 1 shows the histogram of papers throughout the years as well as a tendency line base on the moving average of three periods, which aims at clarifying the evolution of the research field.

The histogram depicts a nonlinear growing of publications in the FFE, with peaks of 15 and 18 papers, respectively in 2011 and 2012. It can be noticed a low profile period from

Table 1. Classification Scheme for Research Methods and Research Lines.

Research Methods	Research Lines
RM1 - Literature review	RL1 - Organizational issues
RM2 - Theoretical Model or Simulation	RL2 - Process and Information
RM3 - Survey	RL3 - Critical success factors and performance
RM4 - Case study	RL4 - Customer involvement
RM5 - Action research	RL5 - Tools and methods
RM6 - Multiple methods	RL6 - Others

1988 to 2005, in which a total of 35 papers were published and the average of papers per year was 2,059. Additionally, an important fact seems to have affected positively the research field just before 2002, since a large increase in the number of published papers occurred this year. The sample was verified in terms of an unusual journal participation in this year, for example, a special issue addressing the FFE, but nothing was identified.

The following period indicates a significant growth in the FFE research field. From 2006 to 2013, a total of 81 papers were published, representing an average of 10,125 papers per year, almost 5 times the average the first period. In addition, 2011 and 2012 shows outstanding performance, with 15 and 18 papers respectively. The Journal of Product and Innovation Management (IJPIM) contributed with 9 papers in these two years, suggesting its further interest in the field. In 2013, a drop on the number of published papers

occurred. This fact can either indicate a decrease of studies or an unusual peak in 2011 and 2012.

3.2. The most important journals, authors and institutions

Three metrics are considered in this section: journals, authors and institutions. A total of 44 journals were part of the sample considered in this study, being that only 11 of them embrace at least three papers, as described in Table 2. In addition, only four of them embrace 45.7% of the published papers. This information is relevant, since it can infer a concentration of the FFE knowledge.

Following, a total of 242 authors were assigned to the papers considered in the sample, being that only 10 of them have contributed with at least 3 papers, as describe in Table 3. This result can suggest little commitment of authors, since their majority does not continue to publish in the research field.

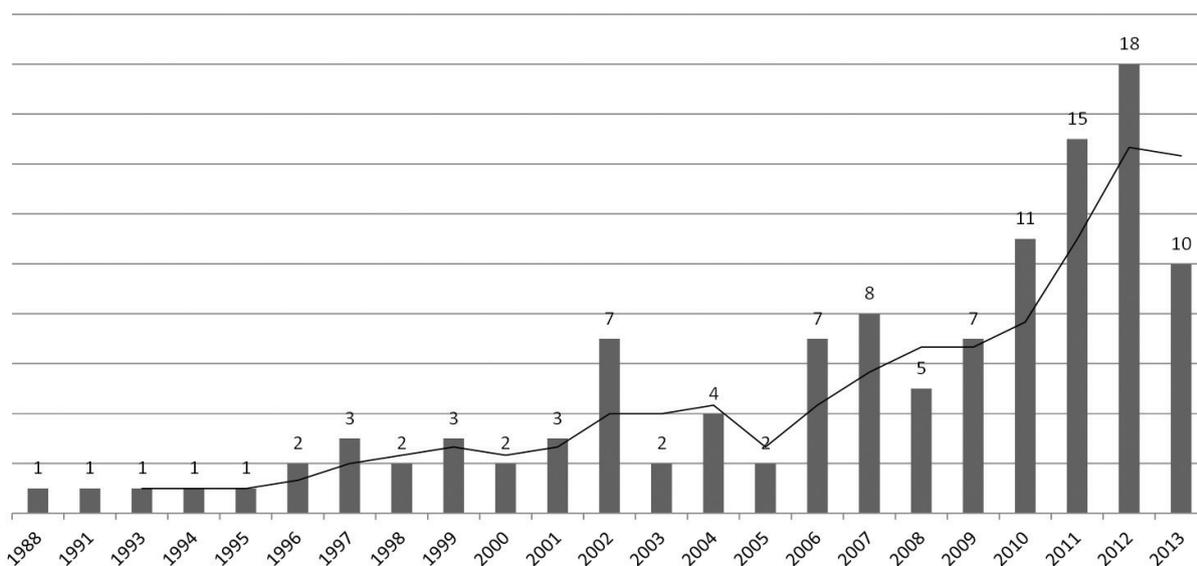


Figure 1. Histogram of papers in the FFE research field from 1985 to 2013.

Table 2. Number of papers published per journal.

Journals	Number of Papers	Percentage of the Sample
Journal of Product Innovation Management	21	18.1
R&D Management	12	10.3
Research-Technology Management	11	9.5
International Journal of Technology Management	9	7.8
IEEE Transactions on Engineering Management	5	4.3
Technovation	5	4.3
Expert Systems with Applications	4	3.4
International Journal of Project Management	4	3.4
Creativity and Innovation Management	3	2.6
Industrial Marketing Management	3	2.6
Journal of Engineering and Technology Management	3	2.6

Then, a total of 139 institutions were responsible for the selected papers, being that only 8 presented at least three papers, as described in Table 4. This result clarifies the universities and countries in which the FFE has been the focus of research.

3.3. The most cited papers

This section addresses the most cited papers from two perspectives: local score citation (LCS) and global score citation (GCS). The LCS considers the most cited papers within the chosen sample. The GCS embraces the most cited papers within Web of Science®, denoting those that were important not only for the FFE, but to other fields.

Based on the LCS, 20 papers were cited at least 5 times for others, including self-citations. This list is presented in Table 5.

The GCS provides significant changes in the most cited papers. In this metric, the number of papers cited at least 5 times increases to 70 and, therefore, the threshold needs to be redefined to effectively highlight the most important ones. Consequently, at this time only papers cited at least 20 times were considered, which lead to the 34 papers presented in Table 6.

There are points for discussion about the papers in Tables 5 and 6. First of all, 16 papers are in both tables, indicating they have influenced papers within and outside

the FFE research field boundaries. These papers are not marked with signals in the number of citations column. Secondly, the marked papers appear only at one table, i.e., are either important to the FFE or to other fields incorporated in the database. On one side, three papers seem to be important only to the FFE: Smith, Herbein and Morris (1999), Borjesson et al. (2006) and Verworn (2006). On the other side, looking at the papers mostly used in other fields, they seem to be important for the new product development and innovation management research fields. This fact was already expected, since the FFE refers to the early stages of the innovation and new product development process (OLIVEIRA et al., 2011).

3.4. The citation network within the sample

The citation analysis can provide an overview of possible research networks in the FFE research field. To this end, a citation network was developed considering a threshold of 5 citations for the local citation score, which correspond to papers described in Table 5. This network is presented in Figure 2, in which the number between brackets is the amount of papers per year. The papers related to each node are described in Table 5

The network shows that the papers indicated by the nodes 1 (COOPER, 1988), 5 (KHURANA; ROSENTHAL, 1997), 7 (SMITH; HERBEIN; MORRIS, 1999), 9 (KOEN et al., 2001) and 14 (LANGERAK; HULTINK; ROBBEN, 2004) seem to be the starting points of the FFE research field. All other papers were affected by at least another paper. Additionally, the network presents central nodes, i.e., papers integrating research topics. The papers of nodes 11 (KIM; WILEMON, 2002), 14 (LANGERAK; HULTINK; ROBBEN, 2004) and 19 (VERWORN; HERSTATT; NAGAHIRA, 2008) cited at least 5 others papers in the network and, therefore, are considered as central nodes.

3.5. The most cited references

A total of 4.215 references were cited in the sample. From these, only 23 references, which were not already part of the sample, were cited more than 10 times. At this time,

Table 3. Number of papers published by author.

Authors	Number of Papers	Percentage of the Sample
Frishammar J.	4	3,4
De Brentani U.	3	2,6
Herstatt C.	3	2,6
Lichtenthaler U.	3	2,6
Montoya-Weiss M.M	3	2,6
O'driscoll T.M.	3	2,6
Poskela J.	3	2,6
Reid S.E.	3	2,6
Rosenthal S.R.	3	2,6
Verworn B.	3	2,6

Table 4. Number of papers published by institution.

Institutions	Country	Number of Papers	Percentage of the Sample
Delft University of Technology	The Netherlands	6	5,2
North Carolina State University	USA	5	4,3
Lappeenranta University of Technology	Finland	4	3,4
Lulea University of Technology	Sweden	4	3,4
Boston University	USA	3	2,6
Carleton University	Canada	3	2,6
Concordia University	Canada	3	2,6
University of Mannheim	Germany	3	2,6

Table 5. List of the 20 most cited papers based on the local score citation.

Paper	Number of Citations	Number for the Citation Network
Khurana and Rosenthal (1998)	41	6
Khurana and Rosenthal (1997)	39	5
Reid and Brentani (2004)	33	13
Koen et al. (2001)	30	9
Kim and Wilemon (2002)	29	11
Moenaert et al. (1995)	26	2
Cooper (1988)	21	1
Murphy and Kumar (1997)	14	4
Reinertsen (1999)	13	8
Verworn, Herstatt and Nagahira (2008)	10	19
Langerak, Hultink and Robben (2004)	10	14
Alam (2006)	9	16
Dahl and Moreau (2002)	7	10
Stevens and Burley (2003)	7	12
Song and Parry (1996)	5	3
Rosenthal and Capper (2006)	5	17
Poskela and Martinsuo (2009)	5	20
Borjesson et al. (2006)	5*	18
Smith, Herbein and Morris (1999)	5*	7
Verworn (2006)	5*	15

*papers checked do not appear in Table 6.

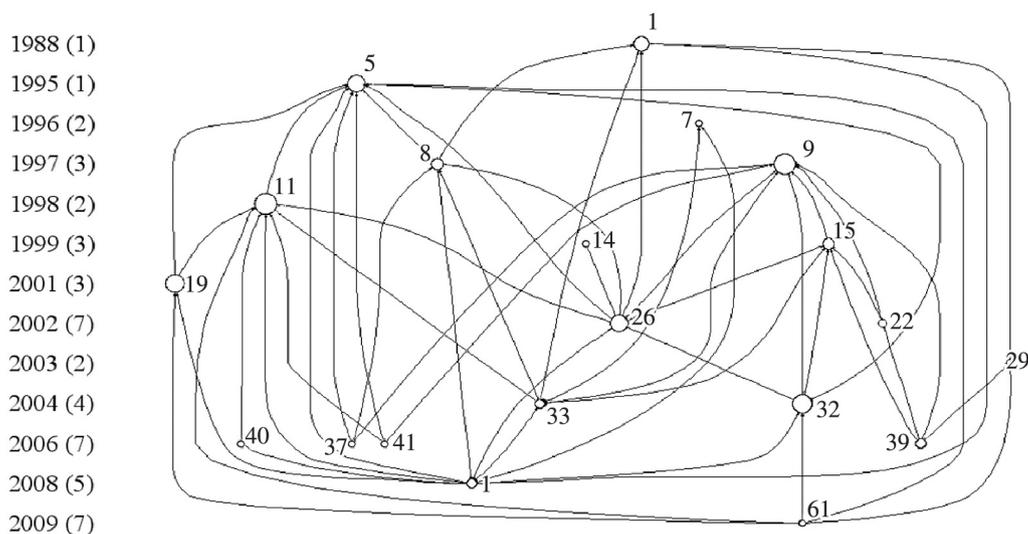


Figure 2. Citation network based on the local citation score.

books were considered among the most cited references, as described in Table 7.

A further analysis of the cited references revealed new papers addressing the FFE research field, which were uncovered in the Web of Science® database. In fact, these papers are also important to understand the field, indicating a limitation of the method adopted in this study. In order to cope with this limitation, the references cited at least 5 times in the sample, which correspond to a total of 142 references, were checked aiming at collecting new papers concerning

the FFE. Then, other 17 papers should have been included as part of the sample, but have not. These papers are presented in Table 8.

It should be noticed that these new papers were not loaded in the bibliometric analysis, due to restrictions of the bibliometric tool to load metadata of papers not included in the Web of Science®. This fact can hinder to some extent the results of the bibliometric analysis and, therefore, represents a key limitation of this study.

Table 6. List of the 34 most cited papers based on the global citation score.

Paper	Number of Citations
Khurana and Rosenthal (1998)	140
Koen et al. (2001)	130
Khurana and Rosenthal (1997)	129
Reid and Brentani (2004)	121
Dahl and Moreau (2002)	116
Groenveld (1997)	112 *
Song and Parry (1996)	89
Cooper (1988)	88
Kim and Wilemon (2002)	82
Moenaert et al. (1995)	75
Alam (2006)	73
Massey, Montoya-Weiss and O'driscoll (2002b)	62 *
Cooper, Edgett and Kleinschmidt (2002)	53 *
Salomo, Weise and Gemuenden (2007)	52 *
Montoya-Weiss and O'driscoll (2000)	47 *
Murphy and Kumar (1997)	38
Rice et al. (2001)	36 *
Verworn, Herstatt and Nagahira (2008)	35
Flint (2002)	35 *
Ayag (2005)	35 *
Reinertsen (1999)	33
Stevens and Burley (2003)	33
Van Riel et al. (2011)	33 *
Rosenthal and Capper (2006)	31
Loch et al. (2001)	30 *
Ozer (2005)	28 *
Van Aken and Weggeman (2000)	26 *
Broering et al. (2006)	25 *
Lin and Chen (2004)	24 *
Langerak, Hultink and Robben (2004)	23
Gerwin (1993)	22 *
Poskela and Martinsuo (2009)	21
Griffiths-Hemans and Grover (2006)	21 *
Brem and Voigt (2009)	20 *

*papers checked do not appear in Table 5.

3.6. The most used words in titles and keywords

Finally, the analysis of titles and keywords confirms the sample fits to the FFE research field, since the words: product, development, front, innovation, end, fuzzy, new, success, performance and communication appear as the 10 most used. These words and their number of citations in the sample are described in Table 9.

In addition, a further analysis of the most cited words could indicate topics commonly embraced in the FFE research field, i.e., subjects being dealt within the field. A content analysis was developed to address appropriately this issue, as introduced in the next section.

Table 7. List of references outside the sample and cited at least 10 times.

Papers	Number of Citations	Reference Type
Brown and Eisenhardt (1995)	19	Paper
Cooper (1987)	18	Paper
Zhang and Doll (2001)	17	Paper
Cooper and Kleinschmidt (1986)	16	Paper
Smith and Reinertsen (1991)	16	Book
Clark and Fujimoto (1991)	15	Book
Cooper (1993)	15	Book
Griffin (1997)	15	Paper
Hippel (1986)	14	Paper
Wheelwright and Clark (1992)	14	Book
Veryzer (1998)	13	Paper
Bacon et al. (1994)	12	Paper
Cohen and Levinthal (1990)	12	Paper
Eisenhardt (1989)	12	Paper
Garcia and Calantone (2002)	12	Paper
Galbraith (1973)	11	Book
Nobelius and Trygg (2002)	11	Paper
Armstrong and Overton (1977)	10	Paper
Cooper (1994)	10	Paper
Cooper (2001)	10	Book
Dwyer and Mellor (1991)	10	Paper
Eisenhardt and Tabrizi (1995)	10	Paper
Yin (1994)	10	Book

4. Content analysis of research methods and research lines

The content analysis followed the classification scheme presented in the research method section. This scheme defines categories for sorting research methods and research lines encountered in the sample. Based on it, the papers were firstly separated between empirical and conceptual research methods. As shown in Table 10, 89 papers adopted empirical methods, being that: 52 of them used a qualitative approach based in a single or multiple cases; 32 applied survey methods, which are quantitative in nature; 3 conducted mixed approaches, since they applied jointly case studies and survey; and 2 were action researches. The conceptual methods accounted for 27 papers. A total of 20 were classified as theoretical models, frameworks, quasi-experiment or simulations, whereas 7 papers were classified as literature reviews or purely theoretical studies.

The analysis of research methods suggests that studies were predominantly empirical and quantitative in the beginning of the research field. The papers in this period (RUBENSTEIN, 1994; MOENAERT et al., 1995; MURPHY; KUMAR, 1996, 1997; SONG; PARRY, 1996)

were mainly concerned to critical factors for supporting the FFE management. As a result, they established a set of best practices and critical areas as well as they introduced the FFE as a complex network of elements with great impact on innovation outcomes.

Table 8. Papers within the FFE research field, but not in the Web of Science[®].

Papers	Number of Citations
Zhang and Doll (2001)	17
Hippel (1986)	14
Bacon et al. (1994)	12
Nobelius and Trygg (2002)	11
Herstatt et al. (2004)	8
Verganti (1997)	8
Cooper (1997)	7
Verganti (1999)	7
Boeddrich (2004)	6
Calantone et al. (1999)	6
Cooper, Wootton and Bruce (1999)	6
Goldenberg et al. (1999)	6
Lilien et al. (2002)	6
Cooper (1985)	5
Cooper et al. (2001)	5
Englund and Graham (1999)	5
Leonard and Rayport (1997)	5

Table 9. List of the 10 most cited words in titles and keywords.

Words	Number of Local Citations
Product	357
Development	303
Front	303
Innovation	282
End	263
Fuzzy	249
New	231
Success	207
Performance	128
Communication	107

Table 10. Classification of papers according to research methods.

Research Methods	Number of Papers	Percentage of the Sample
RM1 - Literature Review	07	6,0
RM2 - Theoretical Model or Simulation	20	17,2
RM3 - Survey	32	27,6
RM4 - Case Study	52	44,8
RM5 - Action Research	02	1,7
RM6 - Multiple Methods	03	2,6

However, after 1997, a shift towards the use of case studies has occurred. From this moment, the majority of studies have applied qualitative approaches, reinforcing the notion that specific topics relating to the FFE are still being explored, tested and consolidated. Moreover, some case studies were also conducted to provide general descriptions of the FFE in different industries.

Afterwards, the papers were classified in terms of the research lines proposed in the classification scheme. Table 11 shows the six research lines in which the papers were sorted as well as the topics embraced by each one.

The process and information research line accounts for the majority of the sample: 42 papers. This fact suggests that the literature moved toward a specialized research agenda, not only discussing FFE models, but increasing knowledge about the FFE phases. Additionally, the ideation and screening phases have gained great attention in the last years (SCHWEITZER et al., 2012; SOUKHOROUKOVA et al., 2012).

The second research line in number of papers was organizational issues. It embraced a total of 25 papers concerning traditional and new topics: uncertainties and planning in the FFE (SONG et al., 2007; STOCKSTROM; HERSTATT, 2008; FRISHAMMAR; FLOREN; WINCENT, 2011); cross-functional integration (MOENAERT et al., 1995; VERWORN, 2006), key roles (STEVENS; BURLEY, 2003; MARKHAM et al., 2010) and dynamic capabilities (BIEDENBACH; MULLER, 2012).

The third most representative research line was tools and methods: 23 papers. This line has grown significantly in recent years, since 15 papers have been published after 2010. In addition, tools such as roadmapping (OLIVEIRA; ROZENFELD, 2010), AHP (LEE et al., 2012) and fuzzy linguistic (HUYNH; NAKAMORI, 2011) have been used in the FFE.

In the critical success factor and performance research line, the number of papers seems to have decreased in the recent years, indicating its maturity. The exception is the study of Markham et al. (2013). Furthermore, the literature has started to embrace new research topics in this line, such as the evaluation process (MARTINSUO; POSKELA, 2011).

Table 11. Classification according to the research lines.

Research Lines	Research Topics	Number of Papers	Percentage of the Sample
RL1 - Organizational issues	cross-integration, knowledge management, formalization, complexity, uncertainties and planning, equivocality, external relationships, roles, degree of innovation, collaboration, capabilities and organizational structure;	25	22,4
RL2 - Process and Information	processes, models, phases (strategy development, ideation, screening, concept development, project planning), information processing and decision making	42	36,2
RL3 - Critical success factors and performance	critical factors, evaluation process, stage-gate, performance measurement and control practices;	16	13,8
RL4 - Customer involvement	customer inputs, learning from customers/users	09	7,8
RL5 - Tools and methods	Roadmapping, AHP, fuzzy linguistic, etc.	23	19,0
RL6 - Others	different FFE research topics that could not be considered in the previous research lines	01	0,9

The customer involvement research line has provided empirical investigations to better understand customer requirements and how to capture their contributions (MAGNUSSON, 2009; PASSILA et al., 2013). It embraced a total of nine papers in the sample.

At last, there are opportunities to expand the FFE research agenda, including new themes or relating it to new trends. For example, only one paper considered sustainable practices in the FFE (PETALA et al., 2010). Although not identified in the sample, another point is the design of product service systems (PSSs), which presents new challenges for the FFE field.

5. Conclusions

The contribution of this paper refers to the literature review of the FFE research field. It has been noticed that the amount of FFE papers has grown in a wide range of academic journals and topics over the last years. Although studies had mainly emphasized the identification of critical factors in the early years, the number of research topics in the FFE has spread out for different lines and perspectives, which means new opportunities for investigation.

This study has limitations that should be addressed in future research, such as the limited scope of the Web of Science® database and the refinement of the proposed classification scheme, mainly in terms of research lines. In addition, further bibliometric analysis need to be performed to describe research groups led by specific authors, which could be achieved through network analysis. The content analysis performed in this paper focused on research methods and research lines as well as it was based on a qualitative approach. It is also recommended to expand the considered topics and to apply quantitative techniques, reducing personal bias.

In conclusion, this study presents preliminary results of a project that intends to provide a complete overview of the state of the art in the front end of innovation research field.

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Appendix 1. The 116 papers selected for the sample.

	Authors	ResearchMethod	ResearchLine
1	Aagaard (2012)	RM5	RL3
2	Aagaard and Gertsen (2011)	RM4	RL3
3	Achiche et al. (2013)	RM4	RL5
4	Adams and Hublikar (2010)	RM2	RL2
5	Akbar and Tzokas (2013)	RM4	RL1
6	Van Aken and Weggeman (2000)	RM1	RL1
7	Alam (2006)	RM4	RL4
8	Artto et al. (2011)	RM4	RL1
9	Ayag (2005)	RM2	RL5
10	Backman, Borjesson and Setterberg (2007)	RM4	RL2
11	Bertels, Kleinschmidt e Koen (2011)	RM3	RL1
12	Bessant et al. (2010)	RM2	RL2
13	Biedenbach (2011)	RM4	RL1
14	Biedenbach and Muller (2012)	RM6	RL1
15	Borjesson et al. (2006)	RM4	RL5
16	Bosch-Rekvelde et al. (2011)	RM4	RL1
17	Bothos, Apostolou and Mentzas (2012)	RM3	RL5
18	Brem and Voigt (2009)	RM4	RL2
19	Brentani and Reid (2012)	RM2	RL2
20	Broering et al. (2006)	RM6	RL2
21	Chang, Wei and Lin (2008)	RM2	RL2
22	Chang, Chen and Wey (2007)	RM4	RL3
23	Clatworthy (2012)	RM5	RL2
24	Cooper (1988)	RM2	RL2
25	Cooper, Edgett and Kleinschmidt (2002)	RM2	RL3
26	Cooper, Wootton and Bruce (1998)	RM4	RL2
27	Cooper, Wootton and Bruce (1999)	RM2	RL2
28	Creusen, Hultink and Eling (2013)	RM3	RL5
29	Dahl and Moreau (2002)	RM4	RL2
30	Elfvengren, Kortelainen and Tuominen (2009)	RM4	RL2
31	Flint (2002)	RM2	RL4
32	Frishammar, Floren and Wincent (2011)	RM4	RL1
33	Frishammar, Lichtenthaler and Kurkkio (2012)	RM4	RL2
34	Frishammar, Lichtenthaler and Richtner (2013)	RM4	RL2
35	Gassmann, Sandmeier and Wecht (2006)	RM4	RL4
36	Gerwin (1993)	RM4	RL1
37	Geschka, Lenk and Vietor (2002)	RM4	RL2
38	Gillier et al. (2010)	RM4	RL5
39	Gish and Hansen (2013)	RM4	RL2
40	Gordon et al. (2008)	RM2	RL5
41	Griffiths-Hemans and Grover (2006)	RM6	RL2
42	Groenveld (1997)	RM4	RL5
43	Groenveld (2007)	RM4	RL5
44	Grote, Herstatt and Gemuenden (2012)	RM3	RL1
45	Hammedi, Van Riel and Sasovova (2011)	RM3	RL2
46	Hannola et al. (2009)	RM4	RL2
47	Heising (2012)	RM1	RL5
48	Van Den Hende and Schoormans (2012)	RM4	RL5
49	Hesmer et al. (2011)	RM2	RL2

Appendix 1. Continued...

	Authors	ResearchMethod	ResearchLine
50	Hong et al. (2004)	RM3	RL1
51	Huynh and Nakamori (2011)	RM4	RL5
52	Im, Montoya-Weiss and Workman Junior (2013)	RM3	RL1
53	Khurana and Rosenthal (1998)	RM4	RL2
54	Kijkuit et al. (2007)	RM2	RL2
55	Kijkuit and Van Den Ende (2010)	RM4	RL1
56	Kim and Wilemon (2002)	RM1	RL2
57	Koen et al. (2001)	RM3	RL2
58	Kristensson and Magnusson (2010)	RM3	RL4
59	Kurkkio, Frishammar and Lichtenthaler (2011)	RM4	RL2
60	Langerak, Hultink and Robben (2004)	RM3	RL3
61	Lee et al. (2012)	RM2	RL5
62	Lee et al. (2010)	RM4	RL5
63	Lin and Chen (2004)	RM4	RL5
64	Loch et al. (2001)	RM4	RL5
65	Magnusson (2009)	RM2	RL4
66	Markham et al. (2010)	RM3	RL1
67	Markham et al. (2013)	RM3	RL3
68	Martinsuo and Poskela (2011)	RM3	RL3
69	Massey, Montoya-Weiss and O'driscoll (2002a)	RM4	RL1
70	Massey, Montoya-Weiss and O'driscoll (2002b)	RM4	RL5
71	Mathews (2010)	RM4	RL5
72	Moenaert et al. (1995)	RM3	RL1
73	Montoya-Weiss and O'driscoll (2000)	RM4	RL2
74	Murphy and Kumar (1996)	RM3	RL3
75	Murphy and Kumar (1997)	RM3	RL3
76	Oh, Yang and Lee (2012)	RM2	RL5
77	Oliveira and Rozenfeld (2010)	RM4	RL5
78	Ozer (2005)	RM1	RL3
79	Ozer (2007)	RM3	RL1
80	Parjanen, Hennala and Konsti-Laakso (2012)	RM4	RL4
81	Passila et al. (2013)	RM4	RL4
82	Petala et al. (2010)	RM1	RL6
83	Poskela and Martinsuo (2009)	RM3	RL3
84	Rauniar and Rawski (2012)	RM3	RL1
85	Reid and Brentani (2004)	RM2	RL2
86	Reid and Brentani (2012)	RM3	RL3
87	Reinertsen (1999)	RM2	RL2
88	Rice et al. (2001)	RM4	RL1
89	Riel et al. (2013)	RM3	RL2
90	Van Riel et al. (2011)	RM4	RL2
91	Rosenthal and Capper (2006)	RM4	RL4
92	Rubenstein (1994)	RM3	RL2
93	Russell and Tippet (2008)	RM4	RL3
94	Salomo, Weise and Gemuenden (2007)	RM3	RL1
95	Sandmeier (2009)	RM4	RL4
96	Schirr (2012)	RM1	RL2
97	Schoonmaker, Carayannis and Rau (2013)	RM3	RL1
98	Schroder and Jetter (2003)	RM2	RL2
99	Schweitzer et al. (2012)	RM4	RL2

Appendix 1. Continued...

	Authors	ResearchMethod	ResearchLine
100	Smith, Herbein and Morris (1999)	RM4	RL2
101	Song and Parry (1996)	RM3	RL3
102	Song et al. (2007)	RM4	RL1
103	Soukhoroukova, Spann and Skiera (2012)	RM4	RL2
104	Spanjol, Qualls and Rosa (2011)	RM3	RL2
105	Khurana and Rosenthal (1997)	RM4	RL2
106	Stevens and Burley (2003)	RM3	RL1
107	Stockstrom and Herstatt (2008)	RM3	RL1
108	Verworn (2006)	RM3	RL1
109	Verworn (2009)	RM3	RL3
110	Verworn, Herstatt and Nagahira (2008)	RM3	RL3
111	Vliegen and Vanmal (1991)	RM2	RL2
112	Wagner (2012)	RM3	RL1
113	Wei and Chang (2011)	RM2	RL5
114	Williams and Samset (2010)	RM1	RL2
115	Wu and Chang (2011)	RM4	RL5
116	Van Zyl, Du Preez and Schutte (2007)	RM4	RL2