

UDC classification: 659.2:004.42

JEL Classification: M110, M150, M190

Benefits of Web-based Idea Management System Application

E. Mikelsons[†],
A. Spilbergs[#],
J.-P. Segers^{##}

Purpose: Research web-based idea management system (IMS) application benefits and their relations with different IMS types and how it is all related to the IMS results – idea quality, idea quantity and involvement.

Design/Method/Approach: On the basis of a commercially available web-based IMS study and the analysis of cases of the IMS use, the main benefits of IMS were identified. The survey verified the most typical benefits for the IMS use. On the basis of a thematic analysis of the benefits, they were grouped together in advance in the thematic groups that were addressed. Data collection: the survey of 400 enterprises with web-based IMS experience was carried out. Data analysis: descriptive statistics and MANOVA analysis were utilized.

Findings: The potential benefits of IMS in 4 main groups: the benefits of an idea management (IM) process, the benefits of innovation management, the benefits of cooperation, and the benefits of general management were determined. According to MANOVA, all groups of benefits have strong connections with all types of a web-based IMS.

Originality/Value: This study fills the previously identified need to clarify the types of IMS and their impact on the results and benefits of IMS application. Academic contribution to the study is (1) it is the broadest survey-based study of the web-based IMS benefits; (2) it applies two classifications of IMS; (3) it explores relations among the results, benefits and IMS types. Practical contribution is the outcomes of the study will help companies to understand what results can be achieved using different types of IMS.

Research Limitations/Future Research: This research opens avenues for the future research on the web-based IMS application in organizations exploring each of the benefit relations with the web-based IMS types.

Paper type: Empirical

Keywords: idea management, idea management systems, benefits.

[†]Elina Mikelsons,
PhD, PostDoc researcher, Idea Innovation Institute, Riga Technical University
and BA School of Business and Finance, Latvia,
e-mail: mikelsons.elina@gmail.com
<http://orcid.org/0000-0002-8979-8308>

[#]Aivars Spilbergs,
Docent, BA School of Business and Finance, Latvia,
e-mail: Aivars.spilbergs@ba.lv
<https://orcid.org/0000-0003-2537-8053>

^{##}Jean-Pierre Segers,
Ph.D. in Economics and Management from the University of Liège (HEC-ULg),
Riga Technical University, Latvia; Hasselt University, Belgium,
e-mail: Jean-Pierre.Segers@rtu.lv
<http://orcid.org/0000-0002-2252-5479>

Reference to this paper should be made as follows:

Mikelsons, E., Spilbergs A. & Segers, J.-P. (2021). Benefits of Web-based Idea Management System Application. *European Journal of Management Issues*, 29(3), 151-161. doi:10.15421/192115.

Переваги застосування системи управління ідеями на основі веб-технологій

Еліна Микельсоне[‡],
Айварс Спілбергс[#],
Жан-П'єр Сегерс^{##}

[‡]Інститут ідей та інновацій, Ризький технічний університет та ВА Школа бізнесу та фінансів, Латвія
[#]ВА Школа бізнесу та фінансів, Латвія
^{##}Університет Хассельта, Бельгія

Мета роботи: Вивчити переваги застосування веб-системи управління ідеями (IMS) та їх взаємозв'язок з різними типами IMS, а також те, як все це пов'язано з результатами IMS - якістю ідеї, кількістю ідей і залученістю.

Дизайн / Метод / Підхід дослідження: На основі комерційно доступного веб-дослідження IMS і аналізу випадків використання IMS були визначені основні переваги IMS. Опитування підтвердило найбільш типові переваги використання IMS. На основі тематичного аналізу переваг вони були заздалегідь згруповані в тематичні групи, які розглядалися. Збір даних: було проведено опитування 400 підприємств, що мають досвід використання IMS в Інтернеті. Аналіз даних: використовували описову статистику і аналіз MANOVA.

Результати дослідження: Були визначені потенційні переваги IMS в 4 основних групах: переваги процесу управління ідеями (ІМ), переваги управління інноваціями, переваги співпраці і переваги загального управління. Згідно MANOVA, все групи переваг тісно пов'язані з усіма типами IMS на базі Інтернету.

Оригінальність / Цінність дослідження: Це дослідження задовольняє раніше виявлену потребу в уточненні типів IMS і їх впливу на результати і переваги застосування IMS. Академічний внесок в дослідження полягає в тому, що (1) це найбільш широке дослідження переваг IMS в Інтернеті; (2) він застосовує дві класифікації IMS; (3) досліджуються взаємозв'язки між результатами, перевагами і типами IMS. Практичний внесок результатів дослідження допоможе компаніям зрозуміти, яких результатів можна досягти за допомогою різних типів IMS.

Обмеження дослідження / Подальші дослідження: Це дослідження відкриває можливості для майбутніх досліджень веб-додатків IMS в організаціях, які вивчають кожне з вигідних відношень з веб-типами IMS.

Тип статті: Емпіричний

Ключові слова: управління ідеями, система управління ідеями, переваги.

Преимущества применения системы управления идеями на основе веб-технологий

Элина Микельсоне[‡],
Айварс Спилбергс[#],
Жан-Пьер Сегерс^{##}

[‡]Институт идей инноваций, Рижский технический университет и ВА Школа бизнеса и финансов, Латвия
[#]ВА Школа бизнеса и финансов, Латвия
^{##}Университет Хасселта, Бельгия

Цель работы: Изучить преимущества применения веб-системы управления идеями (IMS) и их взаимосвязь с различными типами IMS, а также то, как все это связано с результатами IMS - качеством идеи, количеством идей и вовлеченностью.

Дизайн/Метод/Подход исследования: На основе коммерчески доступного веб-исследования IMS и анализа случаев использования IMS были определены основные преимущества IMS. Опрос подтвердил наиболее типичные преимущества использования IMS. На основе тематического анализа преимуществ они были заранее сгруппированы в тематические группы, которые рассматривались. Сбор данных: был проведен опрос 400 предприятий, имеющих опыт использования IMS в Интернете. Анализ данных: использовали описательную статистику и анализ MANOVA.

Результаты исследования: Были определены потенциальные преимущества IMS в 4 основных группах: преимущества процесса управления идеями (ІМ), преимущества управления инновациями, преимущества сотрудничества и преимущества общего управления. Согласно MANOVA, все группы преимуществ тесно связаны со всеми типами IMS на базе Интернета.

Оригинальность/Ценность исследования: Это исследование удовлетворяет ранее выявленную потребность в уточнении типов IMS и их влияния на результаты и преимущества применения IMS. Академический вклад в исследование заключается в том, что (1) это наиболее широкое исследование преимуществ IMS в Интернете; (2) он применяет две классификации IMS; (3) исследуются взаимосвязи между результатами, преимуществами и типами IMS. Практический вклад результатов исследования поможет компаниям понять, каких результатов можно достичь с помощью различных типов IMS.

Ограничения исследования / Дальнейшие исследования: Это исследование открывает возможности для будущих исследований веб-приложений IMS в организациях, изучающих каждое из выгодных отношений с веб-типами IMS.

Тип статьи: Эмпирический

Ключевые слова: управление идеями, система управления идеями, преимущества.

1. Introduction

The nature of economic and management development has changed and, in the 21st century digital technologies are the main game changers. New technology adoption also changes quickly, as it is based on the complex nature of modern IT (Skare, & Sorino, 2021).

IT tools that help to drive knowledge, information and ideas are topical research objects especially during the times of growing importance of distance work activities. There are different types of information management systems, such as group decision support systems, opinion pooling systems, electronic whiteboards etc. One of such systems is an idea management system that provides a systematical and manageable idea generation and evaluation process and the continuation of this process (re-generating and evaluating ideas) (Mikelsone, Volkova & Liela, 2019). Nowadays, more and more processes are being placed in a virtual environment. Idea management systems in the virtual environment are also called web-based IMS (further in the text IMS). These virtual platforms provide idea generation and evaluation process functions and the continuation of this process.

The focus of the study subject is justified both in theory and in practical terms. Firstly, a major study of IMS is underpinning the current global trends: (1) a distance world; (2) creative and knowledge-based economies; (3) IT tool application in organizations; (4) co-creation and co-innovations. Secondly, in the world, the use of a web-based IMS has already become a part of the innovation culture used by many worldwide known organizations in different sectors, such as Fujitsu, Electrolux, Heineken, NASA, Panasonic, Sony, Volvo. Despite being an established topic in research and practice, there are still research gaps (Sandriev, & Pratchenko, 2014; Gerlach & Brem, 2017). During the research, the authors of this article collected information from 107 IMS distributors that have approximately 120000 clients – organizations that apply IMS. Additionally, the authors in previous studies collected 100 IMS application cases studied by well-known companies (Mikelsone, Volkova & Liela, 2019b), plus there are many research that proved many positive results in the companies with IMS (e.g., Aagaard, 2012; Jiménez-Narvaez & Gardoni, 2015; Beretta, 2015; Quandt et al., 2019).

Mostly, research relate the IMS application with the results of idea quality, idea quantity and involvement- the number of involved idea generators (e.g. MacCrimmon & Wagner, 1994; Bjork & Magnusson, 2009; Girotra, Terwiesch, & Ulrich, 2010; Selart, & Johansen, 2011; Deichmann, 2012; Beretta, 2015; Korde & Paulus, 2017). Although in this research the authors use these 3 direct outcomes of these systems, additionally, we add indirect outcomes or benefits, because a web-based IMS is not only about idea direct results. For example, it should be noted that many companies have involved both employees and customers in creating ideas, such as Banco Santander (Spain), to create a custom IMS, one year, involving 183000 people, using IMS ideas for all innovation. 26500 people created 10000 ideas, of which the 100 ideas were further developed. Key benefits are productivity gains, employee engagement gains, innovation creation, cooperation gains, transparency and hierarchy breaking, client engagement co-generation and loyalty gains, and competitiveness gains. As a result, a new framework for the involvement of motivated workers and 40 national customers, a transformed organization culture focused on engagement and cooperation, created a new innovation management process (*Global ideas4all SL, 2018a*). Nestle has also used ideas for all innovation (Spain, Portugal) to introduce an internal innovation culture based on collective intelligence. During a year, 6,000 people were involved, of whom 1,500 created 1,000 ideas (83.33 a month) and 350 of them were focused on improving products, creating a new marketing strategy that contributed to increased sales, opening up a new talent, improving communication and engagement (*Global ideas4all SL, 2018b*), and they were developed further. Only these 2 cases demonstrate additional benefits from the web-based IMS. It is very important to

research these benefits to understand the potential application aims of these systems.

Based on that, the research aims at exploring web-based idea management system (IMS) application benefits and their relations with different IMS types and also how it is all related to the IMS results – idea quality, idea quantity and involvement.

This study is built on the basis of previous studies of a commercially available web-based IMS and analysis of case studies of the IMS application where the main benefits of IMS are identified (Mikelsone, Volkova & Liela, 2019a; 2019b). In this research, authors collected the data with the survey to research materialization of these benefits in an organization. A data collection method is the survey of 400 enterprises with web-based IMS experience, but data analysis methods are descriptive statistics and MANOVA.

This study fills the previously identified need to clarify the types of IMS and their impact on the results and benefits of the IMS application. Academic contribution to the study is (1) it is the broadest survey-based study of the web-based IMS benefits; (2) two classifications of IMS were applied; (3) it explores relations among the results, benefits and IMS types. Practical contribution is the results of the study will help companies to understand what outcomes can be achieved using different types of IMS.

2. Theoretical Background

2.1. Idea Management Systems and Types

In this paper, the authors concentrate their attention on the web-based IMS that is commercially available. These IM systems provide the systematical and manageable process of IM, but IM is the process of idea generation, evaluation, and repeated idea generation and evaluation (Mikelsone, Volkova & Liela, 2019a).

It should be noted that there are empirical studies with an effort to classify IMS. For example, Sandriev, & Pratchenko (2014) outlined 3 types of the IMS software, but it is not clear what study base they were formed on and how exactly they described IMS. Hrastinski et al. (2010) analyzed and classified open innovation technologies, pointed out that IMS is able to achieve greater product adaptation, innovation attraction, information transmission and innovation support at the initial stage. On the other hand, Gamlin, Yourd, & Patric (2007) presented the idea of 'active' IM, distinguishing the latest type of IM from its predecessors - recommendation boxes, but there is no systematic justification for this classification. Based on a systematical and analytical literature review and practical case studies, the authors of this paper created the classifications that will also be applied in this paper. The authors select 2 classifications of IMS:

- 1) based on an IMS focus. IMS could be classified as active and passive. This classification reveals that there is an IMS that passively gathers ideas that are not concentrated on a specific purpose, while the active IMS provides functions to gather ideas for specific purposes;
- 2) based on IMS involved sources. IMS could be classified as internal, external and mixed. An internal IMS provides an opportunity for idea management to involve employees or specific departments. An external IMS provides an opportunity to attract the external sources of idea management, such as society, customers, etc. A mixed IMS provides an opportunity to involve internal and external sources (Mikelsone, Volkova & Liela, 2019a).

2.2. Types Idea Management Benefits and Results

There are 2 main results of IMS that are studied by researchers (See in Tab. 1), namely, idea quality and idea quantity. The quality of ideas, the number of ideas, etc. have an impact on

the success of IMS deployment on the Internet. The most commonly studied IMS results are the quantity and quality of ideas. The quality of ideas represents the number of ideas put forward for development (MacCrimmon, & Wagner, 1994; Bjork, & Magnusson, 2009; Girotra, Terwiesch, & Ulrich, 2010; Selart, & Johansen, 2011; Deichmann, 2012). The quantity of ideas is represented by the number of ideas generated by the idea creators in IMS (MacCrimmon, & Wagner, 1994; Girotra, Ulrich, 2010; Deichmann, 2012; Korde, Paulus, 2017). The quality and quantity of an idea are the most commonly used indicators of the IMS results. Dennis and Garfield (2003) found that the result is also important for the engagement, and there are different ways how to deal with that.

The authors would like to contribute to the IMS result research by adding involvement to the two previously mentioned results. Involvement is the number of people involved in an IM process as idea generators (Dennis, & Garfield, 2003). It was added because many researchers mentioned the importance of engagement in an ideation and innovation process as a very important aspect (e.g. Abu El-Ella et al., 2013; Walton, Glassman, & Sandall, 2016; Bäckström, & Lindberg, 2019). In the future research, the authors are using this element to research the IMS effectiveness, or how many ideas are generated per person etc. See the main definitions in Tab. 1.

Table 1: Idea Management System Results

Term	Definition	Sources
Idea quantity	the number of generated ideas	MacCrimmon, & Wagner, 1994; Girotra, Terwiesch, & Ulrich, 2010; Deichmann, 2012; Korde, Paulus, 2017
Idea quality	the number of selected ideas for the further development	MacCrimmon, & Wagner, 1994; Bjork, & Magnusson, 2009; Girotra, Terwiesch, & Ulrich, 2010; Selart, & Johansen, 2011; Deichmann, 2012
Involvement	the number of people involved in an IM process as idea generators	Dennis, & Garfield, 2003

Source: created by the authors

The benefits are a broad concept. The authors (Mikelsone, Liela, 2016) carried out the study which showed that nearly 200 organizational effectiveness (OE) figures or potential benefits were mentioned in OE literature. There are no correct or incorrect OE indicators, only for a specific purpose of the study according to or inconsistent. Consequently, it is important for the authors to choose the most relevant indicators for a specific purpose of the study. The literature on IM and IMS is relatively limited to the OE or specific benefit dimensions. For example, Perez, Larrinaga, & Curry (2013) studied IMS in the context of sustainability, while Barczak, Griffin, & Kahn (2009) – a new product development achievement, Nilsson, Elg, & Bergman (2002) – strengthening the organization's innovation capacity. Boeddrieh (2004) highlighted the benefits of using a web-based IMS, among which are increasing motivation, increasing transparency, and fewer conflicts with patent-related problems.

In this study, the benefits are included taking into account the prism of the OE, and the selection is made from 199 potential OE dimensions with the IMS case studies, namely, those with practical evidence:

1. The benefits of an idea management process describe the achievement of company objectives in terms of IM, i.e. setting up and developing new ideas, storing ideas, structured and controlled IM, improved IM processes (creating, evaluating ideas), saving IM time, using IM without time, geographic and engagement barriers.
2. The benefits of innovation management describe the achievement of company objectives in terms of innovation management, namely, innovation, innovation culture, more creativity, accelerated innovation management processes, an increased innovation potential, provided ideas for new products, processes, marketing, organizational improvements, and open innovation support.
3. The benefits of cooperation describe the achievement of company objectives in terms of internal and external cooperation, i.e. co-location opportunities, improved internal cooperation, improved external cooperation, increased engagement, team work, increased motivation, training, job satisfaction, an improved relationship within a company, and strengthened trust in an organization.
4. The benefits of general management describe the achievement of company objectives in terms of company management, i.e. more efficient decision-making,

improvements in information management, management efficiency, a company growth, improved quality, customer satisfaction, financial performance, the achievement of objectives, targets, the market uptake of new products, market share, and the ability to respond to changes.

3. Idea Management Systems and Types

Research questions:

RQ1 What are the main benefits of a web-based IMS?

RQ2 How do the IMS application type and results relate to the benefits?

These two questions lead to the main hypothesis:

H1: The results of the IMS use from different types of IMS have an impact on the benefits.

To answer these 2 questions and test the hypothesis, the main results of IMS are included (idea quality, idea quantity, involvement); 2 main classifications of a web-based IMS were applied (the classification based on the focus: active and passive IMS; the classification based on involved sources: internal, external, mixed IMS), and 4 groups of benefits. See the research framework in Fig. 1.

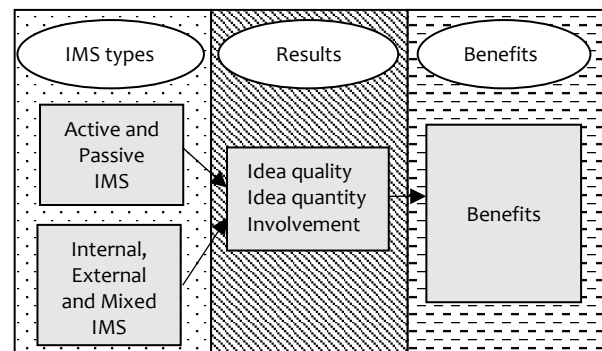


Figure 1: Research Framework

Source: created by the authors

4. Data and methods

On the basis of a commercially available web-based ideas' management system (IMS), and the study and analysis of cases of the IMS use, the main benefits of IMS were identified.

The most typical benefits of using IMS was verified by the survey. Based on a thematic analysis of the benefits, they were grouped together in advance in the thematic groups that were addressed.

4.1. Data Collection

Survey. The survey of the companies using IMS was conducted to obtain primary data on the IMS use and its results. The survey was conducted on the "The QuestBack" platform set up BY UNIPARK (<https://www.unipark.com/>). This platform was selected due to the following reasons: (1) it is focused on academic surveys; (2) it is widely recommended by world-class researchers; (3) it ensures data security required by IMS – BSI-certified data center according to ISO 27001 standard; (4) it is in line with the requirements of the EU General Data Protection Regulation.

It should be noted that in order to reach the survey audience more precisely, 107 IMS representatives described in the study were asked to distribute it to their customers. It was stipulated that the survey should only be sent to the companies using the system in question to the person responsible for IMS (mostly ideas managers, innovation managers or company managers). The authors, in private communication with 107 IMS developers and the information provided by the relevant IMS, concluded that IMS is used by around 120000 companies (derived from the average number of IMS customers (companies) per 107 IMS). At the end, the responses of 400 enterprises with web-based IMS experience were included in the analysis. This survey allowed pooling data on IMS in 8 blocks, corresponding to the types of Adaptive Structuration Theory: (1) IMS; (2) tasks; (3) an organization system; (4) the adaptation and type of use; (5) IMS results; (6) benefits; (7) new structures (not included in the analysis of the study but included on the basis of job limits); (8) problems with IMS (study element to find out not only the positive aspects, but also the negative ones). In this paper, part of the benefits is analyzed. 4 elements updated in literature analysis and empirical studies are used to characterize the benefits. Tab. 2 shows the item block – Benefits Part 1, which includes the benefits of process idea management.

Table 2: Survey Part: Idea Management Benefits

Assumptions	Scales
Idea management system application has improved opportunities to identify new ideas.	(1) Strongly disagree;
Idea management system application has improved idea development.	(2) Disagree;
Idea management system application has improved idea retention.	(3) More disagree than agree;
Idea management system application has improved the structurization of idea management.	(4) Neither agree nor disagree;
Idea management system application has improved the control of idea management.	(5) More agree than disagree;
Idea management system application has improved an overall idea management process.	(6) Agree;
Idea management system application has improved time economy.	(7) Strongly agree.
Idea management system application has reduced geographical barriers for idea management.	
Idea management system application has reduced time barriers for idea management.	
Idea management system application has reduced process barriers for involvement in IM.	

Source: created by the authors

Tab. 3 shows the item block – Benefits Part 2, which includes the benefits of innovation management.

Table 3: Survey Part: Innovation Management Benefits

Assumptions	Scales
Idea management system application has stimulated innovation implementation.	(1) Strongly disagree;
Idea management system application has stimulated an innovation culture.	(2) Disagree;
Idea management system application has improved creativity.	(3) More disagree than agree;
Idea management system application has improved innovation acceleration (from a time perspective).	(4) Neither agree nor disagree;
Idea management system application has improved innovation potential.	(5) More agree than disagree;
Idea management system application has provided product innovation ideas.	(6) Agree;
Idea management system application has provided process innovation ideas.	(7) Strongly agree.
Idea management system application has provided marketing innovation ideas.	
Idea management system application has provided organizational innovation ideas.	
Idea management system application has stimulated an open innovation.	
Idea management system application has resulted in patents.	

Source: created by the authors

Table 4 shows the item block – Benefits Part 3, which includes the benefits of cooperation.

Table 4: Survey Part: Cooperation Benefits

Assumptions	Scales
Idea management system application has stimulated co-creation.	(1) Strongly disagree;
Idea management system application has improved internal cooperation.	(2) Disagree;
Idea management system application has improved external cooperation.	(3) More disagree than agree;
Idea management system application has improved commitment.	(4) Neither agree nor disagree;
Idea management system application has improved teamwork.	(5) More agree than disagree;
Idea management system application has improved the motivation of involved persons.	(6) Agree;
Idea management system application has improved networking.	(7) Strongly agree.
Idea management system application has improved job satisfaction.	
Idea management system application has improved cohesion - strength relations in enterprise.	
Idea management system application has improved involvement.	

Source: created by the authors

Table 5 shows the item block – Benefits Part 4, which includes the benefits of overall management.

4.2. Data Analysis

Descriptive statistics are mean, mode, median that are used to highlight an overall situation.

Analytical statistics are the multivariate analysis of variance (MANOVA) because this analysis considers multiple continuous dependent variables, and bundles them together into a weighted linear combination.

Table 5: Survey Part: Overall Management Benefits

Assumptions	Scales
Idea management system application has helped to achieve the goals.	(1) Strongly disagree;
Idea management system application has improved decision making.	(2) Disagree;
Idea management system application has improved productivity.	(3) More disagree than agree;
Idea management system application has improved information management.	(4) Neither agree nor disagree;
Idea management system application has improved overall management effectiveness.	(5) More agree than disagree;
Idea management system application has improved quality.	(4) Agree;
Idea management system application has resulted in cost reduction.	(5) Strongly agree.
Idea management system application has resulted in income increase.	
Idea management system application has stimulated a turnover growth.	
Idea management system application has improved customer satisfaction.	
Idea management system application has resulted in the growth of the market share.	
Idea management system application has resulted in the growth of the number of new products.	
Idea management system application has helped to set the goals.	
Idea management system application has improved the ability to respond to changes.	

Source: created by the authors

5. Results

5.1. Main Benefits

Three main benefits of the idea management process, based on the results of the survey of averages are identifying new ideas, storing ideas and developing opportunities for new ideas. It should be noted that all the benefits of improving the idea management process included in the study are noted as the representative of the IMS use. In *Tab. 6*, one can see the benefits of using IMS.

Three main benefits of innovation management, based on the results of the mid-cap survey, are a general improvement in innovation uptake and the development of an innovation culture that provides ideas for new products. The only benefit expressly contrasting is the margins of the number of patents most commonly marked by the survey participants as a benefit that is hardly typical. The authors explain this by the fact that these systems are often used not only to get ideas to develop but also as a motivational tool (*Fontana, & Giustiniano, 2015; Gerlach, & Brem, 2017; Georgiev, & Ioni, 2017*). For more detailed idea management gains, see *Tab. 7*.

Three main benefits of cooperation through IMS, based on the results of the average survey, are an increased engagement and strengthened confidence in business, improved internal cooperation, and improved networking. For more detailed cooperation gains through IMS, see *Tab. 8*.

General three main benefits of IMS use management based on the results of the scoreboard are helping to achieve the goals, more efficient decision-making, and developing information management. For more detailed benefits with IMS, see *Tab. 9*.

Table 6: Benefits of the Idea Management Process Based on the Questionnaire

	Opportunities to identify new ideas	Development of new ideas	Retention of ideas	Structuration of IM	Control of IM	Improved overall idea management process	Time economy	Reduced geographical barriers for idea management	Reduced time barriers for idea management	Reduced process barriers for involvement in idea management
Mean	5.77	5.95	5.94	5.61	5.71	5.68	5.43	5.46	5.51	5.49
Mode	7	6	7	6	6	6	6	6	6	6
Median	6	6	6	6	6	6	6	6	6	6

Source: created by the authors

Table 7: Benefits of Innovation Management Process Based on the Questionnaire

	Innovation implementation	Innovation culture	Improved creativity	Innovation acceleration	Innovation potential	Product innovations	Process innovation	Marketing innovation	Organizational innovations	Open innovations
Mean	5.38	5.38	5.19	5.15	5.16	5.35	4.95	4.96	4.7	4.62
Mode	6	6	5	6	6	6	6	6	6	6
Median	6	6	5	5	5	6	5	5	5	5

Source: created by the authors

Table 8: Benefits of Cooperation Based on the Questionnaire

	Stimulated co-creation	Improved internal cooperation	Improved external cooperation	Improved commitment	Improved teamwork	Improved motivation of involved persons	Improved networking	Improved job satisfaction	Improved cohesion	Improved involvement
Mean	5.26	5.32	5.08	5.19	5.24	5.25	5.28	5.1	5.1	5.43
Mode	6	6	6	6	6	6	6	6	6	6
Median	6	6	5	5	5	6	6	5	5	6

Source: created by the authors

Table 9: General Management Benefits Based on the Questionnaire

	Achieve goals	Improved decision making	Improved productivity	Improved information management	Improved overall management effectiveness	Improved quality	Cost reduction	Income increase	Stimulated growth – turnover	Improved consumer satisfaction
Mean	5.77	5.66	4.63	5.56	5.44	4.56	4.77	4.73	4.67	4.69
Mode	7	7	5	6	6	5	5	5	5	5
Median	6	6	5	6	6	5	5	5	5	5

Source: created by the authors

5.2. IMS Types and Results Impact on Benefits

In this research, nonparametric tests (Ellis, et al., 2017) available in R package nrmv were applied. The package output provides “Permutation Test p-value” (PT p), “McKoen’s approximation for the Lawley Hotelling Test” and

“Muller approximation for the Bartlett-Nanda-Pillai Test”. The results of the non-parametric tests regarding the benefits of the idea management process, since these benefits were with the highest evaluation numbers, are summarized in Tab. 10.

Table 10: Nonparametric test results on the benefits of the idea management process

Test	Active IMS ideas created			Active IMS ideas selected			Active IMS involvement		
	Coeff	p-value	PT p	Coeff	p-value	PT p	Coeff	p-value	PT p
ANOVA	22.696	< .001	< .001	10.377	< .001	< .001	12.819	< .001	< .001
McKeon	6.594	< .001	< .001	11.088	< .001	< .001	4.646	< .001	< .001
Muller	5.019	< .001	< .001	6.273	< .001	< .001	3.862	< .001	< .001
Wilks Λ	5.780	< .001	< .001	8.338	< .001	< .001	4.269	< .001	< .001

Test	Passive IMS ideas created			Passive IMS ideas selected			Passive IMS involvement		
	Coeff	p-value	PT p	Coeff	p-value	PT p	Coeff	p-value	PT p
ANOVA	3.850	.001	.101	2.629	.004	.104	3.351	< .001	.013
McKeon	3.771	< .001	< .001	2.714	< .001	< .001	3.072	< .001	< .001
Muller	3.484	< .001	< .001	2.596	< .001	< .001	2.851	< .001	< .001
Wilks Λ	3.645	< .001	< .001	2.665	< .001	< .001	2.979	< .001	< .001

Test	Internal IMS ideas created			Internal IMS ideas selected			Internal IMS involvement		
	Coeff	p-value	PT p	Coeff	p-value	PT p	Coeff	p-value	PT p
ANOVA	2.013	.008	.071	9.413	< .001	< .001	2.446	.005	.071
McKeon	2.073	< .001	< .001	4.972	< .001	< .001	2.472	< .001	< .001
Muller	2.005	< .001	< .001	4.085	< .001	< .001	2.361	< .001	< .001
Wilks Λ	2.045	< .001	< .001	4.522	< .001	< .001	2.429	< .001	< .001

Test	External IMS ideas created			External IMS ideas selected			External IMS involvement		
	Coeff	p-value	PT p	Coeff	p-value	PT p	Coeff	p-value	PT p
ANOVA	3.230	.001	.017	2.606	.008	.151	1.667	.080	0.262
McKeon	2.994	< .001	< .001	2.270	< .001	< .001	2.398	< .001	< .001
Muller	2.864	< .001	< .001	2.239	< .001	< .001	2.290	< .001	< .001
Wilks Λ	2.943	< .001	< .001	2.262	< .001	< .001	2.356	< .001	< .001

Test	Mixed IMS ideas created			Mixed IMS ideas selected			Mixed IMS involvement		
	Coeff	p-value	PT p	Coeff	p-value	PT p	Coeff	p-value	PT p
ANOVA	5.915	< .001	< .001	5.353	< .001	< .001	5.684	< .001	< .001
McKeon	4.693	< .001	< .001	5.042	< .001	< .001	3.807	< .001	< .001
Muller	3.959	< .001	< .001	4.247	< .001	< .001	3.390	< .001	< .001
Wilks Λ	4.335	< .001	< .001	4.653	< .001	< .001	3.623	< .001	< .001

Source: created by the authors

As it can be seen, the results of all tests confirm that in the case of active, passive, internal, external and mixed IMS applications, the effects of creation and selection of ideas, as well as the involvement on the benefits of the idea management process is statistically significant. Only in isolated cases and only ANOVA-type test shows some signs of instability, e.g. in cases of internal IMS use for idea creation and involvement, when the p-values of ANOVA-type permutation test are only slightly above the significance level (.05), and for external IMS in case of use for idea selection and involvement when the p-values of ANOVA-type permutation test exceed the significance level. In the latter case, the results of MANOVA should be used with caution.

For goodness of fit analysis regarding the benefits of the idea management process, pseudo-R-squared according to Nagelkerke and Chi-squared test statistics are provided in Tab 11.

Table 11: Goodness-of-fit

Pseudo-R ²	Chi-squares	df	Significance
.859	837.095	102	< .001

Source: created by the authors

The test result allows concluding that the associations between the types of IMS and the benefits of idea management processes are statistically significant at high confidence level (>.99), and the model has a very good fit.

Cronbach's alpha (.96) indicates high internal consistency reliability of the items in the scale.

Validity analysis was performed according to McDonald R. P. (1999) - a composite reliability ratio (.91) indicates that the inherent consistency of all measurement questions is high. An average variance extracted for all idea management process benefit items together was very slightly below .5, but excluding one (retention of ideas) well above, indicating that convergent validity is adequate.

Quantity, quality and involvement of ideas by different IMS types and their impact on benefits

The results of MANOVA analysis for all types of quantity, quality and involvement and all groups of benefits indicate a significant correlation in all IMS types.

The internal IMS quantity of internal IMS ideas has a significant impact on almost all the benefits, but an exception is improving external cooperation and open innovation. For quality exception is productivity. In terms of the involvement aspect, the exception is the development of an innovation culture, the development of creativity, the achievement of objectives, support for decision-making, and productivity.

The external quantity of an external IMS may not contribute to the identification of ideas, support for decision-making, productivity, improvements in information management, change management, an increased engagement, or improved overall management efficiency. The evaluation of individual indicators shows that the quality of external IMS ideas has a significant impact on almost all the benefits, but the exception is an increase in the amount of innovation in the process. The exception for involvement is the identification of ideas, the processes for reducing barriers, improvements in innovation, increased product innovation, support for decision-making, improvements in information management, improved overall management efficiency, and improved quality.

Mixed IMS. The quantity of mixed ideas has a significant impact on almost all the benefits, but the exception is the development of creativity and productivity.

The active quantity of IMS ideas has a significant impact on almost all the benefits. The exception is the possibility of identifying ideas and productivity. The exception from a quality perspective is patent applications and improved overall management efficiency.

Passive IMS ideas indicate a significant correlation. The assessment of individual indicators shows that passive quantities of IMS ideas have a significant impact on all the benefits, but based on the involvement, the exception stimulates an open innovation. The exception for quality is marketing innovation, process innovation, organizational innovation, improving external cooperation, and productivity.

6. Discussion

Overall results are conjoined with previous results that are based on the methodology how the survey was created, because it was based on the literature review about IMS potential benefits and, from a practical perspective, added elements from 100 IMS application case study results.

There are 2 interesting points for discussion and future research:

- (1) Internal, external and mixed web-based IMS from an open innovation perspective.
- (2) Web-based IMS and Active and Passive from a radical and incremental innovation perspective.

6.1. Internal, external and mixed web-based IMS from Open innovation perspective

Enkel, Grassmann, & Chesbrough (2009) explored IMS as an open innovation tool, expressing the view that it is possible to use both internal and external ideas and emphasizing that the possibilities of a web-based IMS provide an opportunity to use the external sources of ideas. The involvement of external resources in IM is an efficient and useful way of reducing the time and costs required, allowing ideas to be created and valued in virtual sessions (Bothos, Apostolou, & Mentzas, 2008, 2009, 2012). Voigt, & Brem (2006) made a similar proposal by encouraging the involvement of customers, competitors, suppliers to obtain ideas from different sources and to develop the most relevant ideas within the framework of structured IM. Brem, & Voigt (2007) continued this theme by recommending the integration of internal IM with external IM in order to improve the results of an innovation, thus creating an integrated concept of IM, but in these cases, the benefits of IT were not addressed. It should also be noted that IMS is not always used to improve the results of an innovation. Iversen et al. (2009) offered a new form of innovation leadership, which describes and tests a new concept of IM based on the life cycle of an innovation, with a view to supporting the innovation at all stages from start to feedback. Many studies reflect how IMS can be used outside a company where professionals and users value and choose ideas to realize in a company. In view of research trends, IMS includes an element of an open innovation.

Internal idea contests for employees are well-researched areas, and practically it is the most frequently applied approach to organize wide creativity of enterprises (Hober, Schaarschmidt, & von Korfflesch, 2021). Sometimes external idea management is mistaken as a synonym with 'crowdsourcing where new idea submissions from outside the firm boundaries are obtained, selected, evaluated, coded, and integrated into the organization' (Christensen, & Karlsson, 2019, p.240), because an external IMS could involve not only undefined crowds in processes, but very focused external elements. Maybe the future of a web-based IMS is hidden in a mixed IMS, because even at the moment, this type is not very widely applied, but there is a growing trend to apply IMS in this way.

Sandstrom, & Bjork (2010), pointed out that the nature of innovation has shifted over the past decade to an open innovation. Such changes also give rise to new requirements for IMS. And one of these approaches is mixed and external IMS. Researchers study open innovations and IM (e. g. Bothos et al, 2008, 2009; Iversen et al., 2009; Quandt et al., 2019). Hrastinski et al. (2010) analyzed and classified open innovation technologies, pointed out that IMS is able to achieve greater product adaptation, innovation attraction, information transmission and innovation support at the initial stage.

There are many cases surfacing in the pharmaceutical industry and in automotive. Autoliv, an international company for automotive safety solutions, uses IMS BrightIdea to create solutions to various innovation-related issues and to introduce an open innovation approach. In one year, 6,000 people were involved, mainly engineers, creating 1584 ideas, of which 99% were introduced. As a result, the innovation team (BrightIdea, 2017) grew by 800%.

6.2. Active and Passive IMS from a radical and incremental innovation perspective

Sahani, & Divyapriya (2011) described the IMS based on the life-cycle perspective of innovation, where IM aims to support the innovation at all stages, arguing that IM is useful for obtaining both incremental and radical ideas. It is a very interesting aspect for the research to explore further in detail where organizations could find more radical innovations, because there are contradicting opinions, according to the research results: more idea quality comes from an active not passive IMS, but deeper

interviews with experts generated a frequent assumption that a passive approach should not be lost because it does not provide limitations, and so also in such a process, organizations could get more radical ideas (Mikelsone, 2020). It gives an interesting idea for the future research that the authors should examine in the mixed approach – what happens if an organization applies active and passive IM systems at the same time. Nilsson, Elg, & Bergman (2002) investigated IM and innovation linkages, making recommendations to increase innovation capacity through the IMS use, concluding that IMS strengthens innovation capacity in companies. It is interesting that the previous researches proved that an active not passive IMS boosts innovation capacity more, but again the question is what happens in the mixed approach? In turn, Yu, Chen, & Shen (2006) established an IM framework based on innovation management to improve the performance of innovation. It may be possible to create the same framework how to apply both active and passive IM systems not excluding any of the types.

6.3. Summary

The potential benefits of IMS in 4 main groups are: the benefits of an IM process, the benefits of innovation management, the benefits of cooperation, and the benefits of general management. Three main benefits of the idea management process, based on the results of the survey of averages, are: identifying new ideas, storing ideas and developing opportunities for new ideas. It should be noted that all the benefits of improving the idea management process included in the study are marked as the representative of the IMS use. Three main benefits of innovation management, based on the results of the mid-cap survey, are: improving an overall innovation uptake, developing an innovation culture, and providing ideas for new products. The only benefit that contrasts strongly is the marginalization of the number of patents, mostly commonly marked by the survey participants as a benefit that is hardly typical. The authors explain this by the fact that these systems are often used not only to get ideas to develop, but as a motivational tool. Three main benefits of cooperation, based on the results of the average survey, are: an increased engagement and strengthened confidence in the company, improved internal cooperation, and improved networking. Overall leadership of the 3 main benefits, based on the results of the scoreboard survey, are: helping to achieve the goals, more efficient decision-making, and developing information management.

The study provides both practical and theoretical inputs. The results of the study will help companies understand what results can be achieved using different types of IMS.

6.4. Future Research Directions and Limitations

The number of possible research directions were identified over the course of the study. The researcher could focus on how different types of IMS applications are adapted to different tasks and the internal structure of organizations. Case study research could provide a more meaningful insight into the usability of IMS.

Looking into idea management business models could help to understand the full perspective of IMS application, especially the research of open innovation idea platforms. Thus, to stimulate open innovations, organizations should combine internal and external knowledge to create ideas – this model was proven as effective (Eppler, Hoffmann, & Bresciani, 2011). Additionally, the research should focus not only on systems, but also on collaboration and networking aspects as researches show that it is also linked with innovation performance (Segers, 2016).

The main limitations are related to the research design. For example, only 3 IMS results (idea quality, quantity and involvement) are described in the paper and their relations with the benefits of IMS application. Future researches could find and study also other results of IMS. In this research, the list of the benefits was made based on the literature studies (sources till

December 2020 were included) and case studies (case studies till 2018 were included). Future researches could enrich the list of the benefits of IMS application, and focus on more detailed benefit groups, for example, benefits related with sustainability.

This study was conducted only for a commercially available web-based IMS and therefore additional studies are needed to gain insight into the functioning of a non-commercial, private, internally installed and non-digital IMS. Additional studies are also needed to compare non-digital and web-based IM systems. Additional studies are needed to determine why the standard deviation and variation factors are so high. Further studies could provide the evidence of the benefits of using different types of IMS in organizations. This is in line with the call by Van den Ende, Frederiksen, & Prencipe (2015) to study the different types of IMS and their results. The authors' first response is this study, but it shows that there are many additional questions that need answers. The authors are convinced that this study will attract additional attention to IMS from other researchers.

7. Funding

This work was supported by the European Regional Development Fund within the Activity 1.1.1.2 “Postdoctoral Research Aid” of the Specific Aid Objective 1.1.1 “To increase the research and innovative capacity of scientific institutions of Latvia and the ability to attract external financing, investing in human resources and infrastructure” of the Operational Programme “Growth and Employment” (N - 1.1.1.2/VIAA/4/20/670).

8. Competing interests

The authors declare that they have no competing interests.

References

- Aagaard, A. (2012). Idea Management in support of Pharmaceutical Front End of Innovation. *International Journal of Technology Policy and Management*, 12(4), 373-386. doi:10.1504/ijtpm.2012.050138.
- Bäckström, I. & Lindberg, M. (2019). Varying involvement in digitally enhanced employee-driven innovation. *European Journal of Innovation Management*, 22(3), 524-54. doi:10.1108/ejim-01-2018-0008.
- Barczak, G., Griffin, A. & Kahn, B. K. (2009). PERSPECTIVE: Trends and Drivers of Success in NPD Practices: Results of the 2003 PDMA Best Practices Study. *Journal of Product Innovation Management*, 26 (1), 3-23. doi:10.1111/j.1540-5885.2009.00331.x.
- Beretta, M. (2015). *The Role of Idea Management Systems for Innovation in Large Organizations: 3 essays. (dissertation)*. School of Business and Social Sciences, Aarhus University.
- Bjork, J. & Magnusson, M. (2009). Where Do Good Innovation Ideas Come From? Exploring the Influence of Network Connectivity on Innovation Idea Quality. *Journal of Product Innovation Management*, 26(1), 662-67. doi:10.1111/j.1540-5885.2009.00691.x.
- Boeddrich, H.J. (2004). Ideas in the Workplace: A New Approach Towards Organizing the Fuzzy Front End of the Innovation Process. *Creativity and Innovation Management*, 13(4), 274-285. doi:10.1111/j.0963-1690.2004.00316.x.
- Bothos, E., Apostolou, D. & Mentzas, G. (2008). A Collaborative Information Aggregation System for Idea Management, in *Conference on Internet and Web Applications and Services proceedings of the international conference in Athens*, Athens: IEEE, 289-296. doi:10.1109/icw.2008.107.
- Bothos, E., Apostolou, D. & Mentzas, G. (2009). Collective intelligence for idea management with Internet-based

- information aggregation markets. *Internet Research*, 19(1), 26-41. doi:10.1108/10662240910927803.
- Bothos, E., Apostoulou, D. & Mentzas, G. (2012). Collective intelligence with web-based information aggregation markets: The role of market facilitation in idea management. *Experts Systems with Applications*, 39(1), 1333-1345. doi:10.1016/j.eswa.2011.08.014.
- Brem, A. & Voigt, K.I. (2007). Innovation management in emerging technology ventures – the concept of an integrated idea management. *Journal of Technology, Policy and Management*, 7(3), 304 - 321. doi:10.1504/jitpm.2007.015113.
- BrightIdea. (2017). *Autoliv Case Study*. Retrieved from <https://www.brightidea.com/customers/autoliv-saving-lives-through-innovation/>
- Christensen, I. & Karlsson, C. (2019). Open innovation and the effects of Crowdsourcing in a pharma ecosystem, *Journal of Innovation & Knowledge*, 4(4), 240-247, doi:10.1016/j.jik.2018.03.008.
- Deichmann, D. (2012). *Idea Management: Perspectives from Leadership, Learning, and Network Theory*, dissertation, ERIM, Netherland.
- Dennis, A.R., & Garfield, M.J. (2003). The Adoption and Use of GSS in Project Teams: Toward More Participative Processes and Outcomes. *MIS Quarterly*, 27(2), 289-323. doi:10.2307/30036532.
- Abu El-Ella, N., Stoetzel, M., Bessant, J. & Pinkwart, A. (2013). Accelerating High Involvement: The Role Of New Technologies In Enabling Employee Participation In Innovation. *International Journal of Innovation Management*, 17(6), 134002. doi:10.1142/S1363919613400203.
- Ellis, A. R., Burchett, W. W., Harrar, S. W., Bathke, A. C. (2017). Nonparametric Inference for Multivariate Data: The R Package nrmv. *Journal of Statistical Software*, 76(4). doi:10.18637/jss.v076.i04.
- Enkel, E., Grassmann, O. & Chesbrough, H. (2009). Open R&D and open innovation: exploring the phenomenon. *R&D Management*, 39(4), 311-316. doi:10.1111/j.1467-9310.2009.00570.x.
- Eppler, M., Hoffmann, F., & Bresciani, S. (2011). New Business Models through Collaborative Idea Generation. *International Journal of Innovation Management*, 15(6), 1323-1341. doi:10.1142/S1363919611003751.
- Fontana, F. & Giustiniano, L. (2015). New Idea Generation and Individual Motivation: A Conceptual Framework. *Management Studies*, 3(3-4), 77-89. doi:10.17265/2328-2185/2015.0304.002.
- Gamlin, J. N., Yourd, R., & and Patric, V. (2007). Unlock creativity with "active" idea management. *Research-Technology Management*, 50(1), 13-16. doi:10.1080/08956308.2007.11657413.
- Georgiev, E. & Ioni, G. (2017). *Redefining the Purpose of Ideation: the Idea Management System as a Motivational Tool*. Retrieved from <https://lup.lub.lu.se/luur/download?func=downloadFile&recordId=8919978&fileId=8919980>.
- Gerlach, S. & Brem, A. (2017). Idea management revisited: A review of the literature and guide for implementation. *International Journal of Innovation Studies*, 1(2), 144-161. doi:10.1016/j.ijis.2017.10.004.
- Girotra, K., Terwiesch, C. & Ulrich, K.T. (2010). Idea Generation and the Quality of the Best Idea. *Management Science*, 56(4), 591 – 605. doi:10.1287/mnsc.1090.1144.
- Global ideas4all SL (2018a). *Banco Santander*. Retrieved from <https://www.ideas4allinnovation.com/case-study-banco-santander/?lang=en>.
- Global ideas4all SL (2018b). *Nestle*. Retrieved from <https://www.ideas4allinnovation.com/case-study-nestle/?lang=en>.
- Hober, B., Schaarschmidt, M. & von Korfflesch, H. (2021). Internal idea contests: Work environment perceptions and the moderating role of power distance. *Journal of Innovation & Knowledge*, 6(1), 1-10. doi:10.1016/j.jik.2019.11.003.
- Hrastinski, S., Kviselius, N. Z., Ozan, H., & Edenius, M. (2010). A Review of Technologies for Open Innovation: Characteristics and Future Trends. *2010 43rd Hawaii International Conference on System Sciences*. doi:10.1109/hicss.2010.29.
- Iversen, H., Kristensen, K., Scheil Liland, C., Berman, T., Enger, N., & Losnedahl, T. (2009). Idea management: A life-cycle perspective on innovation. *2009 IEEE International Technology Management Conference (ITC)*. doi:10.1109/itmc.2009.7461410.
- Korde, R., & Paulus, P. B. (2017). Alternating individual and group idea generation: Finding the elusive synergy. *Journal of Experimental Social Psychology*, 70, 177–190. doi:10.1016/j.jesp.2016.11.002
- MacCrimmon, K. R. & Wagner, C. (1994). Stimulating Ideas Through Creative Software. *Management Science*, 40(11), 1514 – 1532. doi:10.1287/mnsc.40.11.1514.
- McDonald R. P. (1999). *Test theory: A unified treatment*. Mahwah, NJ: Erlbaum.
- Mikelsone, E., & Liela, E. (2016). Idea Management and Organizational Effectiveness: Research Gap. *Journal of Business Management*, 12(1), 4-24.
- Miķelsone, E., Volkova, T. & Lielā, E. (2019a). Practical Evidence of Web-Based Idea Management Systems: Classification and Application, in *proceedings of the 25th International Scientific Conference "Research for Rural Development 2019"* Latvia University of Life Sciences and Technologies, 15th-17th May 2019, Jelgava, pp.268-275.
- Miķelsone, E., Volkova, T. & Lielā, E. (2019b). Potential Benefits of Web-based Idea Management System Based on Practical Evidence. *ENVIRONMENT. TECHNOLOGIES. RESOURCES*, 2(1), 89-93. doi:10.17770/etr2019vol2.4166.
- Mikelsone, E. (2020). *Dissertation: Ideju vadības sistēmu izmantošanas tipu ietekme uz ideju vadības rezultātiem uzņēmumos*. BA School of Business and Finance, Riga.
- Jiménez-Narvaez, L. M., & Gardoni, M. (2015). Harnessing idea management in the process of technology transfer at Canadian Space Agency. *International Journal on Interactive Design and Manufacturing (IJDeM)*, 9(3), 247–252. doi:10.1007/s12008-014-0254-z.
- Nilsson, L., Elg, M. & Bergman, B. (2002). Managing ideas for the development of new products. *International Journal of Technology Management*, 24(5/6), 498-513. doi:10.1504/ijtm.2002.003067.
- Perez, A., Larrinaga, F. & Curry, E. (2013). The Role of Linked Data and Semantic-Technologies for Sustainability Idea Management, in *Counsell, S. (Ed.), Software Engineering and Formal Methods*, Berlin: Springer-Verlag, 306-312.
- Quandt, C. O., Silva, H. D. F. N., Ferraresi, A. A., & Frega, J. R. (2019). Idea management and innovation programs: practices of large companies in the south region of Brazil. *International Journal of Business Innovation and Research*, 18(2), 187-207. doi:10.1504/ijbir.2019.097257.
- Sandriev, A. R., & Pratchenko, O. V. (2014). Idea management in the system of innovative management. *Mediterranean Journal of Social Sciences*, 5(12), 155-158. doi:10.5901/mjss.2014.v5n12p155.

- Sandstrom, C., & Bjork, J. (2010). Idea management systems for a changing innovation landscape. *International Journal of Product Development*, 11(3/4), 310-324. [doi:10.1504/ijpd.2010.033964](https://doi.org/10.1504/ijpd.2010.033964).
- Segers, J.P. (2016). Regional systems of innovation: lessons from the biotechnology clusters in Belgium and Germany. *Journal of Small Business & Entrepreneurship*, 28(2), 133-149. [doi:10.1080/08276331.2015.1128256](https://doi.org/10.1080/08276331.2015.1128256).
- Selart, M., & Johansen, S.T. (2011). Understanding the Role of Value - Focused Thinking in Idea Management. *Creativity and Innovation Management*, 20(3), 196-206. [doi:10.1111/j.1467-8691.2011.00602.x](https://doi.org/10.1111/j.1467-8691.2011.00602.x).
- Shani, N., & Divyapriya, P. (2011). A Role of Innovative Idea Management in HRM. *International Journal of Management*, 2(1), 69-78.
- Skare, M., & Soriano, D.B. (2021). How globalization is changing digital technology adoption: An international perspective. *Journal of Innovation & Knowledge*. [doi:10.1016/j.jik.2021.04.001](https://doi.org/10.1016/j.jik.2021.04.001).
- Van den Ende, J., Frederiksen, L., & Prencipe, A. (2014). The Front End of Innovation: Organizing Search for Ideas. *Journal of Product Innovation Management*, 32(4), 482-487. [doi:10.1111/jpim.12213](https://doi.org/10.1111/jpim.12213).
- Voigt, K. I., & Brem, A. (2006). Integrated Idea Management in Emerging Technology Ventures. 2006 *IEEE International Conference on Management of Innovation and Technology*, 211-215. [doi:10.1109/icmit.2006.262153](https://doi.org/10.1109/icmit.2006.262153).
- Walton, A., Glassman, B., & Sandall, D. (2016). Increasing innovation through engagement: A critical review of an idea stock market and idea management system. *International Journal of Innovation Science*, 8(4), 293-310. [doi:10.1108/ijis-10-2016-0044](https://doi.org/10.1108/ijis-10-2016-0044).
- Yu, F.Z., Chen, J., & Shen, H.H. (2006). Idea Management Model for NPD Fuzzy Front End: Empirical Analysis Based on All-key-elements Innovation in TIM. *Chinese Journal of Management*, 3(5), 573-579.



This is an open access journal and all published articles are licensed under a **Creative Commons «Attribution» 4.0.**