

Intuition - Knowledge Over Management Science: Lessons From the Past Decades

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Abstract: The subject of intuition in management is interesting and has been discussed for decades. Repositories of scientific publications have in their collections hundreds of publications related to the use of intuition in management. It is necessary and reasonable to summarize the achievements of world science in this area. The best tool to do this will be bibliometric analysis. Bibliometric analysis is a popular method for exploring and analysing large volumes of scientific data but its application in business research is relatively new. A review of publications on this subject will indicate the state of this area of research. As part of the research, an analysis of the number of publications and the number of citations, and keywords statistics will be carried out. The database will be Web of Science. Zotero and VOSviewer program will be the research tools. The review will be carried out following the methodology and will be divided into 5 stages, comprising: preliminary search, full search and literature acquisition, evaluation of collected documents, synthesis and analysis of results, and summary of results. The results will allow for assessing the research activity and the stage of development of the research in the field of intuition in management. A map of keywords related to the described issue will be created. What is the level of interest of scientists in this subject? Is it growing or going down? It will reliably summarise the current state of knowledge, providing information about gaps in the literature. It can also be a way to identify new research areas.

Keywords: Bibliometric analysis, Intuition, Knowledge, Management

1. Introduction

Knowledge is increasingly important in the management process in today's economy. It serves as a strategic resource of the organization (Piersiala, 2014). In this emerging management climate, one resource which is receiving increased attention in such leading publications as *The Wall Street Journal*, *Harvard Business Review*, *Public Management*, and *The Bureaucrat* is the brain skill intuition. Even leading business schools are now experimenting with a new course designed to help develop intuitive skills for decision-making.

Intuition is a feeling in which a person does not analyze what happens and why, because some other feeling tells them how to act. There is probably no other phenomenon equally important for management and less explored than intuition. Yet, intuitive thinking accompanies every manager and influences the objectives set and the way they are achieved (Laszczak, 2011). Intuition is a characteristic that can be attributed not only to individuals, but also to entire working teams.

Business decisions have always been challenging, but in last decades, as the complexities of global economy have deepened, they have become tougher than ever. The choices managers face and the data requiring analysis have multiplied, even though the time for analyzing them has shrunk. One decision-making tool - human intuition - seems to offer a reliable alternative to a painstaking fact of gathering and analysis (Bonabeau, 2003). The media space offers many articles, recordings of films convincing about this fact. This trend has been joined by the rational world of science. Scientific research should encourage managers just to trust their intuition, when facing complicated choices.

Intuition is an attribute of most living organisms, obviously including humans. On the other hand, intuitiveness is also a characteristic often attributed to technical solutions, including software. In the case of application software, an intuitive interface is just as important as extensive functionality. User satisfaction in terms of the usability of software affects their opinion on the system. Providing full functionality of technology and at the same time an attractive user interface is an uneasy task for business solutions.

One of the first definitions seems to be very accurate: intuition is an inductive skill. It is the ability to "see the big picture," to sense the possibilities and implications of any particular situation or potential decision by looking at the whole problem rather than each of its component parts. It is the ability to come up with a workable solution to a problem even when data for making that decision is inadequate or unavailable (Agor, 1985).

Article will be divided into following sections: introduction, literature review, research methodology, results, conclusion and future work. The first part shows the intuition in management. Justifications for taking up the subject. The second part includes the overview on the writing in the field of intuition in management. The third part describes the methodology of the taken research with the particular emphasis on description of the studied

samples, accepted queries. There will be indicated a tool that support the process of analysis and presentation of the collected research material. The next points presents data and calculates the level of dependence. The later phase interprets the numerical data. The presentation of numerical data in tabular form and graphs can be found in the publication. The entire study will be closed with a conclusions including: general summary of the article, its results and findings, compare to findings of other authors, recommendations for practice, research limitations and some suggestions for future research.

2. Systematic Literature Review

Intuition is a valuable sources of organizational knowledge and learning, and contribute to improved decision making in organizations (Doerfler and Ackermann, 2012; Akinci and Sadler-Smith, 2019). Intuition should be conceptualized as a multidimensional rather than a unitary construct comprised of a variety of general and specific mechanisms and processes, and primary types.

A very interesting publication, summarizing research into intuition and management is Intuition in Management Research: A Historical Review (Akinci and Sadler-Smith, 2012). In this historical review, the authors outlined the progress of research into intuition over the past eight decades. They proposed their interpretation of the chronological sequence of events that make up the history of research into intuition in management. They did not use bibliometric analysis and the research was completed in 2010. They found out that until the turn of the century, the development of research into intuition occurred mainly outside the field of management. Moreover, the concept of intuition itself was undefined or poorly defined. Within the framework of research into management, the image was sometimes confusing and contradictory.

Until the turn of the 20th century, an interest in research into intuition within the circle of management researchers was small. Today, we observe an increased interest in this area (Hodgkinson and Sadler-Smith, 2018). There were two reasons for this: intuition is the perhaps least understood aspect of managerial cognition and without understanding intuition it is impossible to develop any meaningful conceptualization of cognition (Doerfler and Ackermann, 2012). In their article they propose a provisional distinction of two types of intuition which they call intuitive judgement and intuitive insight. This distinction helps in developing a better understanding of creative intuition, which is perhaps the least understood of the various types of intuition.

In recent decades intuition researchers in management have identified different types of intuition (Gore and Sadler-Smith, 2011). These are: 'creative intuition', 'expert intuition', 'moral intuition', and 'social intuition' and spiritual intuition (Sadler-Smith and Heliot, 2021). The field of management intuition research itself may also be in something of a state of confusion on matters of epistemology and ontology.

Intuition in management is considered in connection with various areas of management, e.g., the role of intuition in employee selection (Miles and Sadler-Smith, 2014), in different industries or sectors, such as banking and finance (Hensman and Sadler-Smith, 2011), manufacturing (Tsai and Hung, 2023; Wang *et al.*, no date), healthcare (Vazquez-Ingelmo *et al.*, 2020; Mellini and Miletì, 2022), and transportation (Willumsen and Ortuzar, 1985; Chan-Chiao Lin *et al.*, 2003), with a distinction at the management level (Hodgkinson *et al.*, 2009), company size (Marzi *et al.*, 2023).

One should unconditionally agree with the statement that until recently intuition has received scant scholarly attention within and beyond psychological sciences, despite its potential to unify a number of lines of inquiry. At present, the literature on intuition is conceptually underdeveloped and dispersed across a range of domains of application, from education, through management, to health (Hodgkinson, Langan-Fox and Sadler-Smith, 2008). An attempt to organize it has been made in this study. The analysis of the literature and the initially prepared research material allows the formulation of a set of research questions:

RQ1. What are the most relevant scientific categories when it comes to intuition in management?

RQ2. In light of the data analysed, which authors/researchers are the most relevant when it comes to research on intuition in management?

RQ3. In light of the data analysed, which journals are the most relevant when it comes to publishing research results related to intuition in management?

RQ4. What does the association of keywords look like?

RQ5. Which publications should be considered the most important?

3. Research Methodology

Bibliometric analysis is a popular method for exploring and analysing large volumes of scientific data. It enables us to unpack the evolutionary nuances of a specific field, while shedding light on the emerging areas in that field. Yet, its application in business research is relatively new (de Souza Vanz and Chitto Stumpf, 2010; Chen *et al.*, 2020; Donthu *et al.*, 2021). Bibliometric methods have been used to map the fields of strategic management, entrepreneurship, innovation, and others (Zupic and Cater, 2015). The bibliometric analyses scientific publications with a set of indicators under different scopes. It is the aim to recognize scientific trends, to validate statements about scientific development and to look on actors and institutions in the scientific landscape (Tunger and Wilhelm, 2013). The latest systematic and correctly conducted review reliably summarises the state of knowledge to date, reporting any gaps in the literature and the need for new research to be conducted (Mazur and Orłowska, 2018). It is also a way of discovering new research topics. These features make systematic reviews useful in many areas of science and practice, including medicine, education, psychology, management and organisation.

For the bibliometric analysis of keywords program VOSviewer will be used. It is a software tool which can be used to conduct bibliometric analyses and create visualizations from selected databases. This software builds maps based on mathematical algorithms. It is used in other bibliometric studies (Castillo-Vergara, Alvarez-Marin and Placencio-Hidalgo, 2018; Garrigos-Simon, Narangajavana-Kaosiri and Lengua-Lengua, 2018) because it provides especially useful graphical representations with maps based on network data.

To ensure high quality of the analysis, the study will be divided into the following stages:

- Planning, defining the purpose of the review (preliminary search) including testing a few phrases to clarify the topic, testing the issue of non-financial reporting from an accounting perspective;
- Full search and acquiring literature;
- Extraction and evaluation of the evidence collected;
- Result synthesis and analysis;
- Reporting and sharing results.

At the level of Advanced Search Query Builder, various queries were tested. In the final stage, three were analyzed. The first one was TS=(intuition and management), where TS means that the following fields were searched: title, author keywords, abstract, and keywords plus. A total of 1746 publications registered in the database were indicated. However, the in-depth analysis indicated that there were some articles in the results which did not relate to the research questions posed. The second selected research sample was determined and was the result of applying the TS=(intuition) filter with refine by Web of Science Categories: Management. Search); it gave the result of 1110 records, including publications that did not relate to the research questions posed. Ultimately, a sample of 1216 publications was analysed (see Table 1), identified due to the use of the following key:

AK=(intuition AND management) or KP=(intuition AND management) or TI=(intuition AND management) OR AB=(intuition and management)

Table 1: Search Protocol

Criteria	Reserch sample
Database	WOS
Download date	06.03.2023
Timespan (year of first publication)	1900 - 01.2023 (1982)
Query	AK=(intuition AND management) or KP=(intuition AND management) or TI=(intuition AND management) OR AB=(intuition and management),
Sample size	1216
<p>AK - Searches the author keywords field KP - Searches the keywords plus field (KeyWords Plus® are index terms automatically generated from the titles of cited articles. KeyWords Plus terms must appear more than once in the bibliography and are ordered from multi-word phrases to single terms. KeyWords Plus augments traditional keyword or title retrieval) TI - Searches article titles. Title refers to the title of a journal article, proceedings paper, book, or book chapter AB - Searches the abstract field</p>	

Source: Own elaboration.

4. Research Results

Knowledge and intuition are two seemingly opposing issues. On the other hand, intuition can be called internal knowledge. How scientists view the role of intuition in management? The study with the help of bibliometric analysis will summarize the research conducted so far in this area.

169 categories were identified, the most numerous of which are Management, Business, and Computer Science Information Systems (see Table 2). Many articles relate to engineering. This a reflection of an increased interest in creating intuitive vehicles (Chan-Chiao Lin *et al.*, 2003), machines and devices, or software algorithms (Lee, 2018). Understanding the intuitive human factor is essential when developing technical solutions.

Table 2: Web of Science Categories

	Record Count	% of 1216
Management	283	23.27
Business	163	13.40
Computer Science Information Systems	93	7.64
Computer Science Theory Methods	82	6.74
Engineering Electrical Electronic	74	6.08
Education Educational Research	69	5.67
Operations Research Management Science	63	5.18
Economics	62	5.09
Engineering Industrial	55	4.52
Computer Science Artificial Intelligence	54	4.44
Showing 10 out of 169 entries		

Source: Own elaboration based on Web of Science data (access 06.03.23.).

Similar results are provided by the analysis of Research Areas. The articles are found in 108 categories. The three most numerous are Business Economics, Computer Science, and Engineering (see Table 3).

Table 3: Research Areas

	Record Count	% of 1216
Business Economics	417	34.293
Computer Science	222	18.257
Engineering	202	16.612
Education Educational Research	73	6.003
Environmental Sciences Ecology	63	5.181
Operations Research Management Science	63	5.181
Psychology	53	4.359
Social Sciences Other Topics	50	4.112
Telecommunications	36	2.961
Science Technology Other Topics	34	2.796
Showing 10 out of 108 entries		

Source: Own elaboration based on Web of Science data (access 06.03.23.).

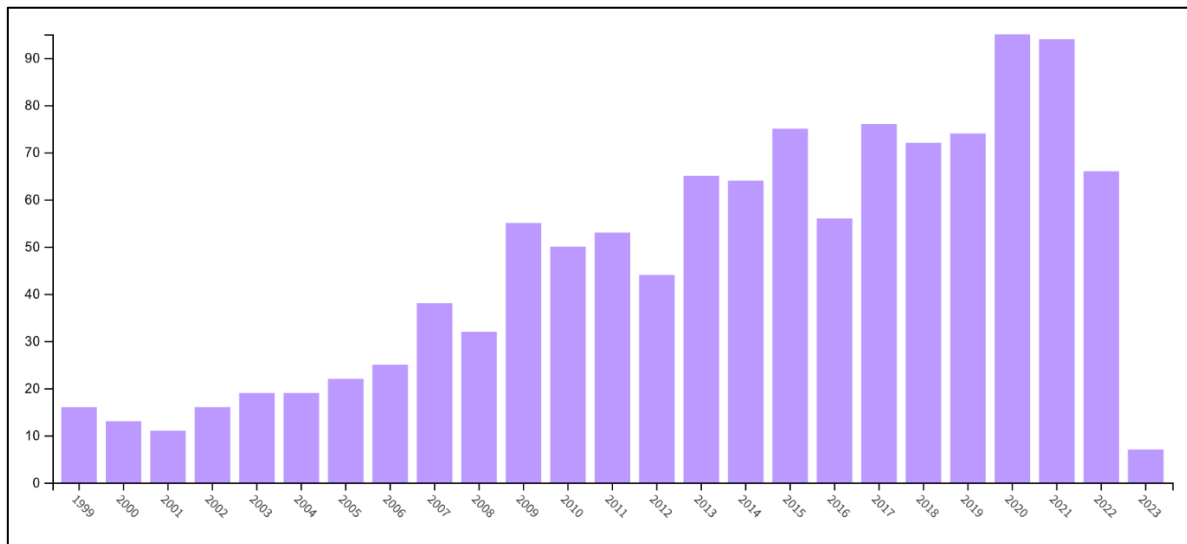
Publications on intuition in management are dealt with by researchers from various geographic areas. Scholars from the United States dominate, with over 27% of publications coming from this country. The next position belongs to England with over 11%, and the third position belongs to China (table 4).

Table 4: Publication by Countries/Regions

	Record Count	% of 1216
USA	329	27.056
England	136	11.184
China	79	6.497
Australia	73	6.003
Italy	61	5.016
Canada	60	4.934
Germany	59	4.852
Netherlands	45	3.701
Spain	41	3.372
France	39	3.207
Showing 10 out of 89 entries		

Source: Own elaboration based on Web of Science data (access 06.03.23.)

A historical approach to research into intuition in management is presented in the literature review *Intuition in Management Research: A Historical Review* (Akinci and Sadler-Smith, 2012). However, this work does not cover the last decade, which has seen a dynamic development of this topic. The first publication in the analyzed sample appeared in 1982 – *Management guidelines - don't mistrust intuition* (Raudsepp, 1982). In the period of 1982 - 1996, 35 publications were produced, with the annual number ranging from 1-7. From this period, particularly interesting publications seem to be: *The road to success* (Totten and Keys, 1994), *The new religion of risk management* (Bernstein, 1996), *Intuition in organizations - leading and management productivity* (Jourden, 1994). The following years saw an increase in the number of publications. The most were published in 2020 - 95 publications, and 2021 - 94 publications. Only the turn of the 20th and 21st centuries can be considered a moment when research into this topic flourished. Nowadays, many researchers from various fields, including management itself, engineering, and psychology, address this topic. The number of publications is significantly increasing. After 2020, it is already close to 100 publications per year (see Figure 1).



Source: Own elaboration based on Web of Science data (access 06.03.23.)

Figure 1: Publication by Time

The search results indicate a total of 3374 individuals who have published in this field. Most of them are co-authorship. The leader is Eugene Sadler-Smith who has published 17 papers in this area, the vast majority of which are co-authored. His most frequently cited work (193 citations) is: *Intuition: A fundamental bridging construct in the behavioral sciences* (Hodgkinson, Langan-Fox and Sadler-Smith, 2008). Like other publications

by this author, it is a must-read for those exploring the role of intuition in management. Another three authors have published five works each. These are: Constantin Bratianu, Said Elbanna, and Gerard Paul Hodgkinson (see Table 5).

Table 5: Name of Author who Publish Mostly

	Record Count	% of 1216
Smith, Eugene Sadler (Guildford, Surrey, England)	17	1.398
Bratianu, Constantin (Bucharest University of Economic Studies)	5	0.411
Elbanna, Said (Qatar University)	5	0.411
Hodgkinson, Gerard Paul (University of Manchester, Alliance Manchester Business School)	5	0.411
Dorfler Viktor (University of Strathclyde Business School)	4	0.329
Kim, Yukyong (Soongsil University)	4	0.329
Li, Yu (Harbin Institute of Technology)	4	0.329
Lin, Chan-Chiao (Eaton Corporation, Galesburg, USA)	4	0.329
Malewska, Kamila (Poznan University of Economics & Business, Poland)	4	0.329
Natu, Maitreya (Mumbai, Maharashtra, India)	4	0.329
Showing 10 out of 3374 entries		

Source: Own elaboration based on Web of Science data (access 06.03.23.)

The papers have been published in over 1100 different publications, which means a large fragmentation of percentage shares (see Table 6). Lecture notes in computer science surprisingly holds the top position, followed by Management decision, Academy of management learning education, and Sustainability.

Table 6: Publication Titles

	Record Count	% of 1216
LECTURE NOTES IN COMPUTER SCIENCE	14	1.15
MANAGEMENT DECISION	11	0.90
ACADEMY OF MANAGEMENT LEARNING EDUCATION	10	0.82
SUSTAINABILITY	7	0.57
EUROPEAN JOURNAL OF OPERATIONAL RESEARCH	6	0.49
EUROPEAN MANAGEMENT JOURNAL	6	0.49
JOURNAL OF BUSINESS ETHICS	6	0.49
TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	6	0.49
INTED PROCEEDINGS	5	0.41
JOURNAL OF ADVANCED NURSING	5	0.41
Showing 10 out of 1105 entries		

Source: Own elaboration based on Web of Science data (access 06.03.23.)

The map of keywords was prepared using VOSviewer software. The map shows the connections between 193 keywords that are combined into 7 clusters, connected by 2765 lines. The paper includes the map in a general sense (Figure 2). The largest cluster, marked in red, contains 33 items, of which the most frequently repeated are: management, knowledge, risk, uncertainty, education, and diagnosis. The second cluster, marked in light blue, is almost as numerous, with 32 dominant words, such as: model, decision making, models, and design. The third cluster, marked in dark blue, contains 31 items: leadership, individual differences, behavior, judgment, tacit knowledge, and expertise. The fourth cluster, marked in yellow, has 30 items, with dominant words such as: systems, knowledge management, firm performance, big data, and supply chain management. The fifth cluster,

rests on more than just a whim of the gods is a revolutionary idea. It is also a very young idea. More than any other development, the quantification of risk defines the boundary between modern times and the rest of history (Bernstein, 1996).

The first publications on intuition in management appeared as early as in 1938 (Akinci and Sadler-Smith, 2012). Although these were individual studies, they should be considered valuable and interesting. Only the turn of the 20th and 21st centuries can be considered a moment when research into this topic flourished. Nowadays, many researchers from various fields, including management itself, engineering, and psychology, address this topic. The number of publications is significantly increasing. After 2020, it is already close to 100 publications per year. Most publications are found in the categories of Management, Business, and Computer Science Information Systems. In the Research Areas category, the most numerous are Business Economics, Computer Science, and Engineering. In the category of geographic distribution, the most numerous publications are from the USA. The most frequently repeated keywords are knowledge, intuition, performance, model, innovation, risk, technology, rationality, and ridership. They are grouped into 7 clusters in the graphic presentation using VOSviewer.

The material presented herein provides answers to the research questions posed. It shows the moment when research in this direction began and the time when research into the issue intensified. It also presents a map of the keyword links. On the one hand, it shows the interdisciplinary nature of research.

The material developed has some weaker points. One of them is the restriction to only a selected single repository, namely the Web of Science database. This means that it does not take into account studies published in journals that were not indexed in the database. As a justification for the above, one may state that the chosen database is one of the two largest databases available. A comparison of the two largest ones, i.e. WoS and Scopus, could constitute a topic for another research. The second point that may be debatable is the choice of the search query. However, in the opinion of the author, who tested various search combinations when approaching the topic, the adopted [AK=(intuition AND management) or KP=(intuition AND management) or TI=(intuition AND management) OR AB=(intuition and management)], is the most objective and authoritative one.

The study is a summary of previous research into the correlation between two concepts: intuition and management. It shows the interdisciplinary nature of the topic. For the scientific community, it can be the basis for further research into this subject matter. For management practitioners, it is a reminder that, in addition to knowledge, there is another effective tool useful in decision-making - intuition. Going further, it seems justified to distinguish a separate subcategory in knowledge management - "intuition management".

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