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Challenges and perspectives for the development of the management sciences subdisciplinarity

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Abstract *The aim of the paper is drawing attention to selected challenges and prospects for the development of subdisciplinarity in the management sciences. The discussion focuses on the impact of the specific characteristics of the management sciences on the diversity of the classification of research specializations and highlights certain determinants related to the environment of the discipline in the process of subdisciplinarity development. The prospects for the development of selected new, emerging subdisciplines in the management sciences were also assessed. Based on a literature review, three research questions were formulated. The realization of the aim of the study was devoted to empirical research conducted among representatives of the scientific community in Poland and China. The results indicate that subdisciplinary diversity is shaped primarily by the dynamics and methodological diversity of the management sciences. According to the respondents, the delineation of research subdisciplines should take into account first and foremost the needs and development perspectives of business practice, be based on researchers' preferences and scientific requirements, focus on prospective directions of scientific development, and take into account international and global trends in the development of the management sciences. Of the subdisciplines considered, informatics in management was considered the most promising. Important development prospects also open up for technology management, tourism management, and visual management studies.*

Keywords management sciences; research methodology; scientific subdisciplines; research specializations; China; Poland

JEL Classification B41, L20, M10

The management sciences¹ are a relatively young scientific discipline, characterized by a rich thematic diversity. One of the procedures for organizing this diversity is to distinguish and classify certain subdisciplines (research specializations) within it. These provide important guidance in defining the boundaries of substantive considerations, and the discussion of them is a manifestation of the development and maturation of the discipline as a whole. Taking this into account, the aim of the paper is drawing attention to selected challenges and prospects for the development of subdisciplinarity in the management sciences. The realization of the aim of the paper was based on empirical research conducted among representatives of the scientific community in Poland and China.

This paper is organized as follows: in the first part, a literature review is carried out, on the basis of which three research questions are formulated. The research methodology and characteristics of the respondents are then discussed. The next section presents the results of the study and, based on this, answers the research questions. The paper concludes with a section that highlights the value and originality of the research, and discusses limitations and directions for further promising research work.

Literature Review and Research Questions

The management sciences, in general, deal with the problems of different types of organizations and cover issues that affect the making of accurate decisions in organizations and their efficient implementation, contributing to the achievement of their objectives (Sudoł, 2012a, p. 36). A similar view is held by A. Zakrzewska-Bielawska (2012, p. 18), who indicates that “the research focus of management science includes the analysis of phenomena and processes occurring in organizations, carried

¹In Poland, the formal name for this scientific discipline is “Management and quality sciences” according to the Regulation of the Minister of Education and Science of October 11, 2022 on scientific fields and disciplines as well as artistic disciplines. Due to the international scope of the paper, it was decided to keep the name “management science”, which is widely accepted in the worldwide scientific community.

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out from the point of view of the efficiency of the functioning of the organization as a whole and its individual subsystems". The scope of the discipline defined in this way translates into a number of diverse research issues. They start with "soft" topics related to sociocultural management problems (Alieva & Powell, 2022) and end with "hard" issues related to technical and technological aspects (De Weck, 2022) as well as statistical and econometric methods in theory and practice of the organization (Soykothe et al., 2024).

One approach to organizing this diversity is its classification into specific subdisciplines based on objective, subjective, methodological, and linguistic (conceptual) differences (Baruch et al., 2022). Subdisciplines are therefore understood here as well-formed and are clearly substantively separated due to the subject and purpose of research, as well as being relatively permanent research specialties within a specific scientific discipline (Sudoł, 2014, p. 29).

In practice, a number of different classifications of management science subdisciplines can be identified, based on the implementation of specific functions (Table 1). These classifications are characterized by the following parameters (Matejun & Feng, 2024):

- range – the geographical area in which the classification is valid,
- scope – setting in a broader classification context. We can distinguish here general lists, which are part of broader classifications of science, and specific lists, used only to distinguish subdisciplines in the management sciences,
- levels – the number of classification levels adopted to distinguish subdisciplines,
- number of subdisciplines (NoSs) – number of separate subdisciplines,
- boundaries – openness to adding new subdisciplines. Includes open classifications, which allow the user to include additional subdisciplines, and closed classifications, which do not provide such a possibility.

Table 1. Functions and examples of classification of subdisciplines of the management sciences

Classification function	Classification example	Characteristics of classification
Building identity and integrating the scientific community	Second version of classification from the Polish Academy of Science: Committee of Organization and Management. It includes 18 subdisciplines that form a hierarchical system of 4 levels: (1) empirical character, (2) subjective criterion, (3) management level and (4) specific research specialties level (Belz et al., 2019).	Range: Poland Scope: specific Levels: 4 NoSs: 18 Boundaries: closed
Identification of scientists' research interests	EIASM classification created by the European Institute for Advanced Studies in Management (n.d.). This is wider classification of economic sciences, including management science subdisciplines. It is divided into 112 specializations at 2 levels: 18 at the first level and 94 at the second level. It has an open nature and additional proposals may be included.	Range: Europe Scope: specific Levels: 2 NoSs: 112** Boundaries: open
Distribution of funds for scientific research	Classification of the Narodowe Centrum Nauki panels (n.d.), developed for qualification and assessment of research projects in Poland. It includes the HS panel: humanities, social sciences, and art, which includes the HS4 subpanel: individual, institutions, markets. It contains a classification of 15 subdisciplines characteristic of management. These include: resources and sustainable development; corporate finance, accounting; marketing; strategic management, concepts and methods of management; and human resources management, along with the possibility of taking into account other related issues.	Range: Poland Scope: general Levels: 3 NoSs: 15* Boundaries: open
Awarding specialties as part of scientific degrees	The Chinese classification of the Academic Degrees Committee of the State Council (Ministry of Education of the People's Republic of China, 2018). This classification includes five management science specializations: (1) management science and engineering, (2) business management, (3) agriculture and forestry management, (4) public management, (5) library intelligence and archives management.	Range: China Scope: general Levels: 2 NoSs: 5 Boundaries: closed
Development of research teams	European Group for Organizational Studies (n.d.) compilation, which operates in dynamic Standing Working Groups (SWGs). Currently, 15 SWGs have been created, including, among others: organization and time; organizing in and through civil society; social movements and organizations; routines and routine dynamic; organizational networks; organizational paradox; digital technology, media and organization; organizing in and for extreme contexts or organization studies in the Anthropocene.	Range: Europe Scope: specific Levels: 1 NoSs: 15 Boundaries: open
Classification of scientific journals	The Scopus-Elsevier classification (<i>Scopus Sources</i> , n.d.) created for classification of scientific journals. It contains 27 subject areas divided into detailed research subdisciplines. From the point of view of the management sciences, a set of 11 sub-disciplines in business, management, and accounting are of relevance, which include, e.g., business and international management; industrial relations; management of technology and innovation; marketing or strategy and management.	Range: international Scope: general Levels: 2 NoSs: 11 Boundaries: closed
Classification of scientific publications	Journal of Economic Literature codes classification system developed by the American Economic Association (2022) as a standard of classifying literature in economics. The current version includes 3 levels of classification with 20 categories at first level, 122 two-digit codes at second level and 857 three-digit codes at the third level (Heikkilä, 2022). The high complexity of the classification results in management science subdisciplines being located in many different categories.	Range: international Scope: specific Levels: 3 NoSs: 857* Boundaries: open

Classification function	Classification example	Characteristics of classification
Support in the selection of scientific journals	The Chartered Association of Business Schools classification of the Academic Journal Guide 2021 methodology (2021) from the United Kingdom. Its aim is to support academics in making appropriate decisions about the selection of academic journals in the management sciences. The compilation includes 22 subject areas, which are dominated by management science specializations.	Range: The United Kingdom Scope: specific Levels: 1 NoSs: 22 Boundaries: closed
Organization of scientific conferences	The thematic scope created for the National Scientific Conference within "Summer School of Management" cycle entitled "Challenges and Perspectives for the Development of Management Sciences". It was organized in 2010 by the Technical University of Łódź, Poland. The deliberations focused on 14 management sciences subdisciplines (Lachiewicz & Nogalski, 2010).	Range: Poland Scope: specific Levels: 1 NoS: 14 Boundaries: closed
Evaluation of university performance	ANVUR classification (2015) from Italy created by the National Agency for Evaluation of the University System and Research. It identifies six subdisciplines of the management sciences; however, including "commodity sciences" is debatable from a substantive point of view.	Range: Italy Scope: general Levels: 3 NoSs: 6* Boundaries: closed
Implementation of official statistics obligations	The Fields of Research (FoR) classification from Australia and New Zealand (Australian Bureau of Statistics, 2020). It is developed for R&D statistics and includes 23 science divisions. One of them is commerce, management, tourism, and services, including 75 management sciences specializations with the possibility of adding additional proposals.	Range: Australia and New Zealand Scope: general Levels: 3 NoSs: 75 Boundaries: open

Note. Within general classifications, the number of the entire classification levels is presented.

*Including subdisciplines from other, mainly economics-related, scientific disciplines.

Source: Own elaboration, based on (Matejun & Feng, 2024).

Examples of other classifications aimed at building identity and integrating the management sciences community in Poland are the proposals of

- S. Sudoł (2014), within which he proposed three general specializations: (1) theoretical foundations of management, (2) management in commercial organizations, and (3) management in public organizations, as well as 10 specific subdisciplines, including, among others, strategic management, human resources management, marketing, and quality management;
- Committee of Economic Sciences, Polish Academy of Science (Gorynia, 2013). This distinguishes six subdisciplines in management science in order to distinguish the discipline within the field of economic sciences.

Also of interest are the classifications used by international organizations, e.g., the Academy of Management (AoM) and the European Academy of Management (EURAM). In the first case, the Divisions & Interest Groups (DIG AoM) classification (n.d.) is used, comprising 26 specializations that integrate AoM members into three specific clusters: (1) microcluster, focused on individual people, (2) macrocluster, related to industries, markets, and professions, and (3) mesocluster, focused on social structures positioned between the micro and macro domains. This classification is closed, but there are changes due to developments in management science. In contrast, the classification of the EURAM Strategic Interest Groups (2009) includes 13 subdisciplines, including, among others, business for society, corporate governance, entrepreneurship, managing sport, project management, public and nonprofit management, and strategic management.

An example of another proposal used to classify scientific journals is the Web of Science *Journal Citation Reports* (n.d.), including 254 categories divided into 21 subject groups. A list of subdisciplines specific to the management sciences can be found in the "Economics & Business" group. It lists 21 subdisciplines, some of which relate to economics or other scientific disciplines (e.g., economics, demography, geography) and some of which are interdisciplinary (e.g., area studies, ethnic studies, urban studies). A next example is the six-digit UNESCO classification of fields in science and technology (United Nations Educational, Scientific and Cultural Organization, 1988) which includes 24 specific fields of science, including economic sciences (code 53), which are divided into 13 disciplines and 90 subdisciplines. The specialities of the management sciences are located in the disciplinary organization and management of enterprises, where 10 subdisciplines are distinguished, with the possibility of including additional proposals.

The issue of subdisciplines in management science has so far been the subject of many interesting scientific studies. Nogalski (2015), for example, analyzed the thematic scope of 361 habilitation applications from 2007 to 2015 using the first classification of 21 subdisciplines of the management sciences developed by the team of the Committee of Organization and

Management, Polish Academy of Science (Cyfert et al., 2014). The results indicate that research was most often conducted in such subdisciplines as strategic management (58 cases), knowledge and information management (39), human resource management (28), and marketing management (28). In addition, the author notes that there is a so-called problem hybrid in many cases, making it difficult to qualify the promotional work to a specific research specialization. A similar study on a sample of 150 habilitation self-reports from 2019 was conducted by Komańda (2020). He also used the first classification of 21 subdisciplines of the management sciences developed by the team of the Committee of Organization and Management, Polish Academy of Science (Cyfert et al., 2014) to assess the thematic nature of the research problems undertaken. The results showed that the main habilitation achievements fell primarily into subdisciplines related to management levels (strategic, operational, and functional levels).

Swacha (2022), in turn, used the second classification of 18 subdisciplines of the management sciences developed by the team of the Committee of Organization and Management, Polish Academy of Science (Belz et al., 2019) for thematic analysis of management science research in Poland in 1990–2021 based on a review of papers published in the journal *Organization Review*. A total of 3217 articles were analyzed, on the basis of which 3274 unique keywords occurring in the metadata of publications were identified.

The results showed a thematic predominance of the practical stream (87%) over the theoretical one (13%), as well as topics relating to levels of management (82%) over those relating to types of organization (18%). At the same time, the strategic (40%) and operational (37%) levels of management are significantly more often represented than the functional level (23%). Among organization types, however, business entities (85%) dominate in popularity over public ones (15%).

The next stream of considerations includes research on the formation of the scientific identity of selected subdisciplines in the management sciences, such as strategic management (Suszyński, 2019), entrepreneurship (Cieślik, 2015), human resources management (Pocztowski, 2018; Nogalski, 2021), international business (Gorynia & Jankowska, 2017), service management (Rokicki & Nogalski, 2021) or accounting (Czapla & Walińska, 2021). Another important research direction is the formulation of demands for transforming specific research topics into subdisciplines in the management sciences. This includes such issues as public management (Sudoł & Kożuch, 2010), international entrepreneurship (Patora-Wysocka, 2015), military logistics (Jałowiec, 2019), and value-based management (Jaki, 2023).

Scientific practice therefore indicates that there is no single, universally accepted classification of management science subdisciplines. In detail, this subdisciplinary diversity is to a large extent determined by the specificity of the discipline of management science expressed primarily by (Kozłowski & Matejun, 2018):

- pluralism and even methodological eclecticism and the associated polymethodicity of management (Sułkowski, 2015a). This is due to combining the achievements and traditions of many scientific disciplines in management science and absorbing from them elements useful from one's own research perspective;
- relatively low level of strictness, universalism, objectivity, and permanence of scientific laws, with the simultaneous predominance of the projective function and striving to ensure practical usefulness of the research results (Sudoł, 2012a);
- the importance of research self-reflection (Jemieliński & Kostera, 2010) and the need to pay attention to the limitations of the research carried out, which are an important part of the discussion on the results obtained (Geletkanycz & Tepper, 2012);
- utilitarian character of this discipline, related to its membership in the group of applied sciences with high practical values (Czakoń, 2016). This is due to the historical development of these sciences, which evolve in response to the needs of practice, which translates into their greater dynamism compared to other scientific fields with more established traditions;
- the importance of methodological triangulation (Myers, 2013), which presupposes the need to use different, mutually correcting and verifying research methods, and the great potential of using mixed-methods research (Sułkowski & Lenart-Gansiniec, 2023) in understanding complex management problems;
- the extensive use of qualitative methods, allowing for a more precise grasp of the specifics of phenomena and consideration of the impact of nonmeasurable or hard-to-measure variables on management processes (Bansal & Corley, 2011);
- the specific nature of theories with the dominance, in terms of scope, of medium-range theories and microtheories, while in terms of course, of dynamic process analysis (Sułkowski, 2015b);
- a strong desire to search for subject and subjective distinctiveness and methodological identity in the broader context of social and economic sciences (Kołodziejczak & Sobczyk, 2006).

Koźmiński (2007) also draws attention to the relative youth of the discipline of the management sciences linked to the significant dynamics of its development, which influences the very strong differentiation of the issues undertaken. The expression of this dynamism includes both the qualitative progress in the conducted research and the quantitative increase in the number of researchers (Bojar & Głodziński, 2021). This dynamism is also related to the continuous emergence of new strands of research that aspire to a distinct identity as they develop (Czakoń, 2019). These considerations lead to the formulation of the first research question:

RQ1: How do the characteristics of management science influence the diversity of subdiscipline classifications in this scientific discipline?

The subdisciplinarity of the management sciences is at the same time linked to the whole spectrum of determinants of their socioeconomic and scientific environment. One may therefore wonder in which direction its development and evolution should take place. Hensel (2017) points out that an overly strong link to business practice may pose a threat to the scientific status of the discipline. Therefore, should the development of subdisciplinarity take into account first and foremost the needs and perspectives of the scientific sphere or the economic-social sphere? The development of the environment and subdisciplinarity of the management sciences is also conditioned by the broader political and regulatory context, as exemplified by the evaluation of scientific activity (Kulczycki, 2017) or the rules of science funding (Czakon, 2024). Since it significantly influences the course and outcomes of scientists' work (Woleński, 2021), it is worth considering to what extent the development of subdisciplinarity should take into account political preferences and regulatory requirements, and to what extent it should be related to scientists' preferences and the requirements of scientific work. It should also be noted that the development of subdisciplines, on the one hand, is a consequence of the historical progress of management science (Witzel, 2017; Mills & Novicevic, 2020). On the other hand, it can take into account prospects for the future development of the management sciences. The question remains to what extent the progress of subdisciplinarity should relate to international/global trends in management sciences development and to what extent it should reflect the national specificities of the research work carried out. The considerations identified above inspire the second research question:

RQ2: What determinants of the socioeconomic and scientific environment shape the development of subdisciplinarity in management science?

Finally, the question arises about the future of the subdisciplinarity of management science, which involves the dynamic emergence of new research specializations. Currently, the most common subdisciplines in the classifications presented above include "human resources management", "marketing", "strategic management", "project management", "logistics", and "finance management" (Kozłowski & Matejun, 2018). However, there is an ongoing discussion in the literature about new, promising research specializations, among which we can mention, for example, "military management" (Parlak, 2023) or "national defence management" (Krykun et al., 2021), subdisciplines related to the development of the sensory sphere, e.g., "arts management" (Evrard & Colbert, 2000; Rentschler & Kirchner, 2012), or "visual management studies" (Bell & Davison, 2013), and with the development of the leisure economy (Tribe, 2011), e.g., "sports management" (Retar et al., 2015; van der Roest et al., 2015) and "tourism management" (López-Bonilla & López-Bonilla, 2021). Specializations linked to the technological development of organizations are also becoming important, including, for example, "technology management" (Gudanowska, 2017) or "informatics for management" (Maryska & Sladek, 2017). In light of the examples cited, the third research question of RQ3 therefore arises:

RQ3: How are the prospects for the development of new, emerging subdisciplines in the management sciences assessed?

The aim of the study and the answer to the research questions posed were pursued through our own empirical research, the methodological basis and results of which are presented later in this paper.

Research Methodology

The realization of the aim of the study was addressed by the author's own empirical research conducted using an expert opinion survey (Bougie & Sekaran, 2020, pp. 126–127). The survey involved 31 representatives of the management science community, including 20 researchers from Poland and 11 from China. The selection of respondents was purposive. Invitations were sent to:

- the staff of the Economics and Management School at the Chongqing Jiaotong University in China,
- members of the Committee of Organization and Management Sciences of the Polish Academy of Sciences,
- researchers in the management sciences who were interested in the survey.

An email survey technique was used. The research tool was an original expert questionnaire prepared in an MS Word document, containing 12 questions and a metric.

The respondents to the survey were mainly associate professors, individuals with a long period of scientific activity (more than 20 years), conducting mainly applied research to solve practical problems, rather than to acquire only basic knowledge. Detailed characteristics of the respondents are presented in Table 2.

Table 2. Characteristics of respondents to the survey

Gender	n	%	Period of work at university	n	%
Female	12	39%	Up to 5 years	2	6%
Male	19	61%	6–10 years	7	23%
Academic position	n	%		n	%
Professor	7	23%	11–15 years	7	23%
Associate professor	14	45%	16–20 years	5	16%
Assistant professor	7	23%	Above 20 years	10	32%
			Type of research activity	n	%
Lecturer/University Lecturer	2	6%	Theoretical considerations	3	10%
Assistant lecturer/Associate lecturer	1	3%	Basic research	8	26%
Age	n	%		n	%
31–40 years	9	29%	Applied research	20	64%
			Preferred research methods	n	%
41–50 years	11	36%	Quantitative research	14	45%
51–60 years	6	19%	Qualitative research	15	48%
Above 60 years	5	16%	No empirical research	2	7%

Source: Own elaboration based on the results of the survey.

Respondents represented a variety of research specialities within the management sciences, including, among others, marketing, strategic management, logistics, entrepreneurship, finance management, project management, human resources management, innovativeness, and public management.

The research was conducted during the author's research fellowship at Chongqing Jiaotong University, China. Therefore, the origin of respondents involved in the survey was intentional and resulted from scientific cooperation with Chinese scientists. This approach allowed for assessing whether the geographical context affects the diversity of respondents' opinions about challenges and perspectives for the development of management science subdisciplinarity.

Statistical analysis was performed using IBM SPSS Statistics (Stehlik-Barry & Babinec, 2017). Statistical tools such as count analysis, mean, standard deviation, Student's t-test, and factor analysis were used in the analysis process (Verma & Abdel-Salam, 2019). composite reliability (CR), average variance extracted (AVE) and Cronbach's alpha coefficient (α Cr) were used to assess internal consistency and reliability of factors. The following acceptance levels were adopted for these CR > 0.7 and AVE > 0.5 (Shrestha, 2021). Due to the exploratory nature of the analyses conducted, the acceptance level of α Cr coefficient was lowered to > 0.5 (Streiner, 2003).

Research Results

First, the influence of specific characteristics of the management sciences on the diversity of research specialty classifications was analyzed. Respondents rated the influence of the individual characteristics discussed in the theoretical part of the paper on the creation of subdiscipline classifications on a scale from 1 (very low influence) to 5 (very high influence). Additionally, the results were differentiated due to the international scope of the survey, and the differences between the responses of Chinese and Polish respondents were analyzed using the Student's t-test. The results are presented in Table 3.

Table 3. The opinions of the surveyed scientists about the impact of management science characteristics on the diversity of subdiscipline classifications

Characteristics of management sciences	Total in the sample		China		Poland		Student's t-test	
	M	SD	M	SD	M	SD	t	p
Methodological pluralism and polymethodology of management sciences	3.65	0.84	3.45	0.52	3.75	0.97	−0.937	0.36
The current, dynamic/turbulent stage in the development of management sciences	3.48	0.96	3.64	0.92	3.40	0.99	0.648	0.52
Searching for merit and methodological identity of management sciences in the social sciences	3.38	1.21	3.27	1.01	3.44	1.34	−0.366	0.72

Characteristics of management sciences	Total in the sample		China		Poland		Student's t-test	
	M	SD	M	SD	M	SD	t	p
Focus on analysis of dynamic processes	3.23	1.28	3.36	1.43	3.15	1.23	0.437	0.66
A relatively low level of accuracy, universality, objectivity, and sustainability of scientific laws	3.10	0.84	3.18	0.75	3.05	0.91	0.398	0.69
Relative "youthfulness" of management sciences	3.07	1.00	3.00	0.89	3.11	1.08	-0.286	0.78
Importance of research self-reflection in management sciences	3.06	1.12	3.36	1.03	2.90	1.17	1.103	0.28
Belonging of management sciences to a group of highly practical applied sciences	3.00	1.21	3.27	0.90	2.85	1.35	0.928	0.36
The importance of methodological triangulation in management sciences	2.90	1.01	2.91	1.04	2.9	1.02	0.024	0.98
The wide range of applications of qualitative methods	2.87	1.28	3.09	1.58	2.75	1.12	0.701	0.49
Domination of medium range theory and microtheories	2.77	0.77	2.82	0.87	2.74	0.73	0.273	0.79

Source: Own elaboration based on the results of the survey.

According to the respondents, the fact of the diversity of subdisciplines is primarily due to the methodological pluralism and polymethodicity of the management sciences. The next three determinants of the diversity of subdisciplines in the management sciences are due to the dynamic nature of the discipline, resulting from both the current turbulent phase of its development, the search for an identity in the broader context of the social sciences, and the substantive specificity oriented toward the analysis of the dynamics of processes in organizations. In the opinion of the respondents, on the other hand, the diversity of subdisciplines is influenced to a relatively least extent by specific methodological conditions resulting from the extensive use of research triangulation and qualitative research methods, as well as the scope of inference limited mainly to medium-range theories and microtheories.

In order not to limit respondents' opinions to the characteristics of management science proposed in the cafeteria, the expert questionnaire used a semi-open question with the possibility to indicate additional answers. However, none of the surveyed experts used this option. Furthermore, the analysis of the variation of responses by country of respondent did not reveal statistically significant differences in the responses of respondents from China and Poland.

In order to deepen the inference, an attempt was made to extract specific, substantively consistent categories of determinants of the diversity of subdisciplines in the management sciences. An exploratory factor analysis using principal component analysis was used for this. The results of the correlation counterimage matrix for all variables obtained values > 0.5 , thus qualifying all considered characteristics for further analysis. A variance maximizing (varimax) rotation was used to extract the principal components. Based on the scree plot, it was assumed that the most favourable solution would be to extract five factors (components). In further calculations, values of factor loadings > 0.5 were taken into account. Coefficients were used to assess the internal consistency of the obtained factors: CR, AVE, and α Cr. The results of the factor analysis are presented in Table 4.

Table 4. Classification of the determinants of diversity of management science subdisciplines using factor analysis on the basis of the opinions of the surveyed scientists

Characteristics of management sciences	Component					Consistency assessment
	1	2	3	4	5	
The importance of methodological triangulation in management sciences	0.86					CR=0.87
The wide range of applications of qualitative methods	0.82					AVE=0.69
Searching for merit and methodological identity of management sciences in the social sciences	0.81					α Cr=0.74
Focus on analysis of dynamic processes		0.87				CR=0.78
Importance of research self-reflection in management sciences		0.74				AVE=0.54
A relatively low level of accuracy, universality, objectivity, and sustainability of scientific laws		0.58				α Cr=0.61
Methodological pluralism and polymethodology of management sciences			0.85			CR=0.79
The current, dynamic/turbulent stage in the development of management sciences			0.76			AVE=0.66
						α Cr=0.75

Characteristics of management sciences	Component					Consistency assessment
	1	2	3	4	5	
Belonging of management sciences to a group of highly practical applied sciences				0.87		CR=0.78
Relative youthfulness of management sciences				0.72		AVE=0.64 α Cr=0.53
Domination of medium range theory and microtheories					0.83	n/a
Cumulative % of explained variance	22.43	39.90	54.83	67.75	78.81	

Note. A matrix of rotated components. Factor extraction method, principal components; rotation method, Varimax with Kaiser normalization; rotation reached convergence in nine iterations.

Source: Own elaboration based on the results of the survey.

The first of the identified factors refers to the search for a substantive and methodological identity for the management sciences within the broader context of the social sciences. As it also encompasses the extensive use of qualitative research methods and the importance of triangulation in the research process, its synthetic character can be described as “methodological specificity of the management sciences”. The second factor, on the other hand, emphasizes the “interpretive specificity of the management sciences”, which is mainly expressed through the focus of considerations on the dynamics of organizational processes and the relatively low level of accuracy, universality, objectivity, and sustainability of scientific laws. In this context, research self-reflection, which enables a broader, critical view of the research process through, among other things, the prism of limitations and opening up new areas of research, also becomes important.

The third of the designated factors refers to the current dynamic phase of development of the management sciences and emphasizes the importance of methodological pluralism and polymethodology in the management sciences. For this reason, its synthetic character can be described as “dynamism and methodological pluralism in management sciences”. Another factor focuses on the relative youthfulness of the discipline, which historically derives from industrial research conducted in the United States at the turn of the 20th century. As it also accentuates the affiliation of the management sciences with a group of highly practical applied sciences, its synthetic character can be described as the “pragmatic nature of the management sciences”. The last factor, on the other hand, emphasizes the “theoretical specificity of the management sciences”, which is expressed through the domination of medium-range theory and microtheories in this scientific discipline.

All the extracted synthetic components achieved fully acceptable CR and AVE levels, and in the case of components No. 1 and No. 3, the internal consistency was also confirmed by the α Cr coefficient. In contrast, conditionally acceptable values of α Cr coefficient were obtained for components No. 2 and No. 4. > 0.5 . On the basis of the obtained results of the factor analysis and the average rating of the respondents for each of the identified components, a hierarchy of factors determining the subdisciplinary diversity of the management sciences was created, as shown in Table 5.

Table 5. Hierarchization of the diversity factors of management science subdisciplines on the basis of the opinions of the surveyed scientists

Component No.	Proposed label	Total in the sample		Hierarchy	China		Poland	
		M	SD		M	SD	M	SD
1	Methodological specificity of management sciences	3.03	0.94	4	3.09	1.12	3.00	0.86
2	Interpretative specificity of the management sciences	3.12	0.84	2	3.30	0.82	3.02	0.85
3	Dynamics and methodological diversity of the management sciences	3.56	0.54	1	3.55	0.47	3.58	0.59
4	Pragmatic nature of the management sciences	3.06	0.95	3	3.14	0.81	3.03	1.03
5	Theoretical specificity of the management sciences	2.68	0.91	5	2.82	0.87	2.60	0.94

Source: Own elaboration based on the results of the survey.

The results of the hierarchy indicate that, according to the respondents, the component relating to the dynamics and methodological diversity of the management sciences has a large (relatively, the largest) impact on the diversity of subdisciplines. The next three components, according to the respondents, are moderately responsible for the diversity of the subdisciplines of the management sciences. These are the interpretive specificity, methodological specificity, and the pragmatic nature of the discipline. To a rather weak degree, on the other hand, the diversity of the subdisciplines is shaped by the theoretical

specificity of the management sciences. Also, in the case of this hierarchy, the analysis of the diversity of responses by country of respondent did not show statistically significant differences in the responses of respondents from China and Poland.

The second part of the survey analyzed determinants of socioeconomic and scientific environment (identified in the theoretical part of the paper) to be taken into account when dividing management science into scientific subdisciplines. Each evaluated aspect was expressed by two opposing options, and respondents were asked to indicate their preferred option on a scale ranging from 1—in case of full preference for option (1) to 5—in case of full preference for option (2). The results obtained from the mean value of the responses, taking into account the international scope of the survey, are presented in Table 6.

Table 6. Opinions of the surveyed scientists about the role of determinants from the socioeconomic and scientific environment in shaping the development of subdisciplinarity in management science

Determinants	Total in the sample		China		Poland		Student's t-test	
	M	SD	M	SD	M	SD	t	p
(1) The needs and development prospects of the economic/social sphere vs. (2) scientific sphere	2.68	1.08	2.64	1.12	2.70	1.08	-0.155	0.88
(1) Political preferences and regulatory requirements vs. (2) scientists/researchers' preferences and scientific requirements	3.81	1.17	4.18	0.40	3.60	1.39	1.741	0.09
(1) Development of management sciences so far vs. (2) prospects for the future development of management sciences	3.94	0.77	4.09	0.54	3.85	0.88	0.827	0.42
(1) National vs. (2) international/global trends in management sciences development	4.29	0.82	4.27	0.65	4.30	0.92	-0.087	0.93

Source: Own elaboration based on the results of the survey.

According to the respondents, the delineation of subdisciplines in the management sciences should take slightly more account of the needs and development perspectives of economic practice (i.e., the economic and social sphere) than the needs and development perspectives of the scientific sphere. The creation of a classification of subdisciplines should furthermore be based somewhat more on the preferences of researchers and scientific requirements than on the political preferences and requirements of the regulatory sphere. It is also more important to consider prospects for the future development of the management sciences in this process rather than focus on the existing achievements of the management sciences. In the opinion of the respondents, international and global trends in the development of the management sciences should also be strongly considered when distinguishing research specializations, rather than national conditions for the development of this discipline of science. At the same time, the analysis of the differentiation of responses according to the country of the respondent did not reveal statistically significant differences in the responses of respondents from China and Poland.

The final part of the survey assessed the development prospects of new, emerging subdisciplines in the management sciences. Respondents rated seven sample subdisciplines on a scale from 1 (very low/low development prospects) to 5 (very high/high development prospects). The results obtained from the average responses, taking into account the international scope of the survey, are presented in Table 7.

Table 7. Opinions of the surveyed scientists about the development prospects of selected emerging subdisciplines in the management sciences

Emerging management sub-disciplines	Total in the sample		China		Poland		Student's t-test	
	M	SD	M	SD	M	SD	t	p
Informatics in management	4.42	0.72	4.55	0.69	4.35	0.75	0.717	0.48
Technology management	4.16	0.73	4.09	0.54	4.20	0.83	-0.441	0.66
Tourism management	3.61	1.17	4.00	0.77	3.40	1.31	1.382	0.18
Visual management studies	3.58	0.96	4.00	0.77	3.35	0.99	1.882	0.07
Sports management	3.26	1.21	3.36	0.81	3.20	1.40	0.412	0.68
Military management/national defense management	3.16	1.29	3.82	0.87	2.80	1.36	2.232	0.03*
Arts management	2.71	1.16	2.55	0.69	2.80	1.36	-0.691	0.50

Source: Own elaboration based on the results of the survey.

Student's t-test, *significant at 0.05.

The results indicate that the respondents rate the development prospects of most of the proposed subdisciplines highly, with the development prospects of information technology in management being relatively highly rated. According to the respondents, there are also significant prospects for subdisciplines such as technology management, tourism management, and visual management studies. However, respondents assessed the possibilities of further development of sport and military management/national defense management to a moderate extent. The prospects for the development of the arts management subdiscipline were rated the lowest. The analysis of the differences in responses depending on the respondent's country did not reveal statistically significant differences in the assessment of most subdisciplines. The exception is the opinion on military management/national defense management. The development prospects of this subdiscipline were rated significantly higher by respondents from China compared to the responses of experts from Poland.

In order not to limit the respondents' opinions only to emerging subdisciplines proposed in the cafeteria, a semi-open question was used in the expert questionnaire with the possibility of indicating additional answers. Three respondents took advantage of this opportunity, proposing a total of seven subdisciplines that, in their opinion, have significant development prospects. They mostly concern subdisciplines related to public management: public logistics, public security management, and public management, and broadly understood, marketing, advertising management, and trade fair management. The respondents also indicated risk management and artificial intelligence management as promising subdisciplines.

Answers to Research Questions

The conducted research contributed to achieving the aim of the paper and made it possible to answer the formulated research questions:

- RQ1: How do the features of the management sciences influence the diversity of classifications of subdisciplines in this scientific discipline?

The research results indicate that, according to experts, subdisciplinary diversity results primarily from the dynamics and methodological diversity of the management sciences. The dimensions of this factor are the methodological pluralism and polymethodology of the management sciences as well as the current, dynamic, and turbulent stage in the development of this scientific discipline. These features are related to drawing inspiration from many different scientific disciplines, which affects the diversity of methods and techniques used in organizational research (Wojtczuk-Turek, 2015, p. 8–9). A derivative of this complexity is the increase in the diversity and number of research specialties, leading to difficulties in creating their uniform classification. This problem is confirmed by Sułkowski and Lenart-Gansiniec (2021, p. 20), who emphasize that “the multitude of management methods is related to the existence of various scientific schools and paradigms, as well as the diversity of management sub-disciplines”. Sudoł (2012a, p. 59) also emphasizes that the emergence and development of new problems and research areas, characteristic of the dynamic phase of development of the management sciences, is the reason for the emergence of new research specialties. The next three factors that make it moderately difficult to formulate a uniform classification of subdisciplines in the management sciences concern the interpretive and methodological specificity of the management sciences and the pragmatic nature of this scientific discipline. These challenges are pointed out by Cyfert et al. (2014), who emphasize that “management sciences as utilitarian sciences are intensively developing and evolving in response to the needs of practice, which translates into their greater dynamics compared to other fields of science with already established traditions”. As a result, new research specialties are being rapidly incorporated into this discipline to meet the needs of developing theories and solving problems in economic practice. To a relatively smallest (weak) extent, subdisciplinary diversity is shaped by the theoretical specificity of the management sciences, mainly related to the domination of medium-range theory and microtheories.

- RQ2: What determinants of the socioeconomic and scientific environment shape the development of subdisciplinarity in management science?

According to the respondents, the delineation of subdisciplines in the management sciences should take into account, first and foremost, the needs and development perspectives of business practice; be based on the preferences of researchers and scientific requirements; focus on the forward-looking directions of science; and take into account international and global trends in the development of the management sciences. The first of these postulates is largely present in current classifications

of subdisciplines. An example is the classification of the Committee on Organization and Management Sciences of the Polish Academy of Sciences (Belz et al., 2019), in which subdisciplines are distinguished according to two research streams, the practical and the theoretical. This classification is dominated by the logic of separation based on practical needs, as this strand is additionally internally structured (by types of organization and levels of management, including strategic, operational, and functional levels), and 15 such subdisciplines were proposed against 3 included in the theoretical strand. In this context, it seems important to have the right balance between the two spheres because, as Trzcieniecki (2005) notes, sciences oscillating between practice and theory are at risk of losing their status as science by focusing too much on practical applications.

The focus on prospective directions of science development is clearly visible, among others, in the EGOS classification, which is dynamically adapted to the most current and promising research topics. The international scope of the considerations is, in turn, emphasized, among others in such classifications as ANZSRC 2020 (international business subdiscipline), EURAM (international management), EIASM (international business, international marketing) or Scopus (business and international management).

- RQ3: How are the prospects for the development of new, emerging subdisciplines in the management sciences assessed?

Among the proposed research specialties, respondents considered information technology in management to be the most promising. According to the respondents, technology management, tourism management, and visual management studies also have significant development prospects. The possibilities of further development of sport and military management/national defense management were assessed to a moderate extent, with respondents from China rating military management/national defense management significantly higher. However, the prospects for the development of the arts management subdiscipline were rated the lowest.

The reason for the higher assessment of military management/national defense management by respondents from China may be the specificity of the Chinese classification of sciences ADCSC 2018, in which "Military studies" was given a high rank as one of the 13 independent fields of science. It includes 10 specific disciplines, including "military leadership" and "military affairs management". In accordance with the Regulation of the Minister of Education and Science on fields of science and scientific disciplines and artistic disciplines (Regulation of the Minister of Education and Science of October 11, 2022), there is no independent field of military sciences in Poland, and research in this field is conducted in the discipline of "security sciences" within the field of social sciences.

The evaluated subdisciplines are already present in scientific practice and are shaping both the outcome identity as well as the functional and institutional identity of management science (Trocki, 2005). An example is the journal *Tourism Management* (ISSN 0261-5177) published by Elsevier, for publication in which researchers in Poland receive 200 points according to the latest list of scoring journals of the Ministry of Science and Higher Education (Communication of the Minister of Science of January 5, 2024). Other examples include journals such as *International Journal of Arts Management* (ISSN: 1480-8986, 100 points) or *Journal of Engineering and Technology Management* (ISSN: 0923-4748, 140 points).

From the functional aspect, one could mention the Master of Science in Clinical Informatics Management at Stanford University, the Master in Technology Management at Yale School of Management or the Master in Visual Communication Management at Ohio University. In institutional terms, examples include the Department of Informatics in Management at Gdańsk University of Technology, the Department of Arts Management at the Prague University of Economics and Business, or the international association Arts Management Network (2024).

Importantly, all the subdisciplines assessed are interdisciplinary and even interfield in nature. This alludes to the idea of interdisciplinarity in the evolution of management science (van Baalen & Karsten, 2012), while at the same time fitting in with the postulate of cooperation between different disciplines in solving the complex problems of this discipline of science in the future (Sudoł, 2019). Such an approach can contribute to the important development of management science because, as Specht and Crowston (2022) show, collaboration in interdisciplinary diverse teams has a positive impact on scientific output, e.g., the number of scientific papers and citations.

Conclusion

The research presented in this paper is part of a broader discussion on the determinants and prospects for the development of subdisciplines in management science (Sudoł, 2012b). Their strength and novelty lie in giving voice to experts representing

the discipline of science and gathering international opinions on selected aspects of subdiscipline development. They enable a better understanding of the links between the characteristics of management science and the logic of the separation and evolution of the diversity of subdisciplines in this area of science. They also provide a valuable voice in the discussion of the general factors and prospects for the development of research specializations in this scientific discipline.

When considering the conclusions resulting from the empirical analyses, one should also take into account the limitations of the conducted research (Geletkanycz & Tepper, 2012). These include, first and foremost, the scope of the sample limited to 31 representatives of the scientific community from Poland and China and the high subjectivity of assessments resulting from the survey method adopted. The negative consequences of the small sample size were offset by the involvement of key representatives of the management science community, including, among others, representatives of the Committee of Organization and Management Sciences of the Polish Academy of Sciences from Poland. On the other hand, the subjectivity of respondents' assessments was limited by the appropriate design of the expert questionnaire, which very precisely defined the purpose of the study and clearly and unambiguously described the issues to which respondents referred. In addition, comparative analyses of the responses of Polish and Chinese respondents were carried out to check whether the nationality context of the people taking part in the survey influenced the answers given.

The dynamic nature of progress in the management sciences points to the need for continued research on the challenges and prospects for the development of research speciality classifications. Particularly valuable directions for further research work may include the assessment of the impact of subdisciplinarity on the formation of the identity of the management sciences in the outcome and functional and institutional dimensions. Analyses concerning the determination of the thematic scope of subdisciplines and their impact on the development of the management sciences in the long term will also be important. Certainly, therefore, there should be a discussion in the scientific community directed at improving the classification of subdisciplines in the management sciences in theory and research practice.

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