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SUB-DISCIPLINES IN MANAGEMENT SCIENCES: CRITERIA OF SUB-DIVISION IN THEORY AND RESEARCH PRACTICE

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ABSTRACT

This paper aims to identify the key criteria for distinguishing sub-disciplines in management sciences and evaluate their application in national and international science classifications. Documents from 16 different countries and areas were studied semantically. Triangulation was used to study 16 sub-discipline classifications and survey expert opinions among 31 representatives of management sciences from Poland and China to achieve the paper's purpose. Based on the results, the classifications use various criteria for categorising sub-disciplines, with the key criteria being (1) resources, (2) activity areas, (3) management concepts and methods, and (4) types of organisations. Meanwhile, the extent of their use is well in line with the expectations of the management sciences community representatives participating in the survey. The paper proposes a theoretical framework of 13 distinguishing criteria and characterises 16 classifications of sub-disciplines in management science from different countries. The theoretical considerations provide a good insight into the logic of creating a classification of sub-disciplines. They also provide a better description and understanding of the role of research specialisations in building the identity, organisation, and development of the management sciences community. The results align with a discussion on improving the classifications of management sciences' sub-disciplines. They are essential in identifying future and promising research specialisations within management sciences. They are helpful in the process of reviewing and/or placing particular research issues or problems in specific sub-disciplines of management sciences.

KEY WORDS

classification of science, management sciences, scientific sub-disciplines, research methodology

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INTRODUCTION

An important feature of management sciences is their strong thematic diversity and interdisciplinarity, showing links with other scientific disciplines (Sudoł,

2012, pp. 29–58). Zakrzewska-Bielawska (2012, pp. 15–17) emphasised that the areas of interest for management are constantly developing and expanding. Their problematic scope is so complex that no universally shared view on the matter has emerged to date. In this situation, scientific sub-disciplines, which express relatively narrow research specialisa-

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tions within management sciences, play an essential role in organising this diversity.

Research literature and practice propose many different classifications of management sciences' sub-disciplines. However, there is a lack of deeper reflection on the criteria for dividing and distinguishing these sub-disciplines in theory and research practice. This issue has been highlighted by many authors, e.g., Gorynia (2018, p. 15), who asked: "To what extent the classification postulates (how it should be) formulated by science scholars are respected in the classifications of science adopted for various purposes (how it is)?" The reviewer of this paper very accurately identified these approaches as positive (how it is) and normative (how it should be). With that in mind, this paper aims to identify the key criteria for distinguishing sub-disciplines in management sciences and evaluate their application in national and international science classifications.

The presented literature review was conducted to achieve the paper's purpose and operationalise the research problem into two research questions. Next, the author's research methodology is presented. Two research methods were used: document study and expert opinion survey. The following section analyses and interprets the research results. A scientific discussion answers the research questions, confronts the results with the literature on the subject, and points to the limitations of the conducted research. The conclusions formulate the main research findings and identify promising directions for further work on this topic.

1. LITERATURE REVIEW AND RESEARCH QUESTIONS

An essential feature of science understood as a systematic and comprehensive human endeavour in searching for objective and testable truth about reality (Wagner, 2022), is its great thematic diversity. One way to organise this diversity is to classify it, which involves designating and characterising specific components (fragments) of science in the form of disciplines and fields and their sub-disciplines/sub-fields/research specialisations based on objective, subjective, methodological, and linguistic (conceptual) differences (Pabis & Jaros, 2009; Baruch et al., 2022). Sub-disciplines are understood as formed and substantively distinguished due to the subject and purpose of research or permanent research specialisations

within a specific discipline of science (Soliwoda, 2012, p. 337; Sudoł, 2014, p. 29). They are treated as collections of theoretical knowledge and sets of necessary skills (Jasińska, 2020) essential for solving thematically defined research problems.

The literature has long been debating the need and validity of science classification, including economic and management sciences, which involves two trends: to specialise and generalise or to differentiate (diversify) and unify (integrate) science (Fleming, 1880; Bronk & Majdański, 2009; Pabis & Jaros, 2010; Cyfert et al., 2014; Gorynia, 2018; Şengöz, 2020). Classification opponents mainly point to the lack of precise, uniform principles and criteria for the science division, an overly administrative approach to the issue, and the difficulties in capturing the entirety of scientific knowledge that results from the divisions. For example, Szarucki et al. (2022) noted that with a constantly growing bulk of knowledge in different sub-disciplines of management sciences, there is a growing demand for the consolidation, organisation, and synthesis of the existing knowledge.

Proponents point to the vital importance of science classification in organising the activities of scientific institutions, conducting advancement procedures in science, academic teaching, or distributing research funding. The division of science into thematic components also plays an essential role in creating and developing scientific communities and environments (Ross, 2021) and bibliometric analyses (Shu et al., 2019; Shu et al., 2020). Gorynia (2008, p. 40) also underlined the importance of the internal classification of sciences. However, he emphasised the challenge of classifying science, which is primarily determined by subjective factors, such as the opinion of prominent scholars or influential groups of scientists. As a result, there are varying solutions to classifying scientific specialities within different scientific communities and countries, making it very difficult to agree on these divisions internationally.

In this situation, the discussion on the type, scope, and application of specific criteria for distinguishing scientific sub-disciplines becomes of vital importance. In management sciences, this issue has been widely discussed by Sudoł (2012), suggesting that research issues in management sciences can be considered according to the following criteria:

- types of organisations: enterprises (production, commercial, service, finance, multi-entity, and others), nonprofit organisations, administrative, military and other units. An additional criterion may be the geographic range of conducted activ-

ity, allowing to distinguish, e.g., management problems considered locally, regionally, nationally, or in international markets;

- functions of management: planning, organising, motivating, and controlling;
- areas of activity/functions of the organisation, e.g., production management, logistics management, quality management, marketing management, personnel management, finance management, technological process management, etc.;
- processes: core, support, and service processes;
- resources: material and non-material resources, e.g., human, technical, knowledge and information, and financial resources;
- management level: strategic, tactical, and operational management;
- concepts and methods of management, e.g., system, project management, or change management.

Representatives of the Committee of Organisation and Management Sciences of the Polish Academy of Sciences (Cyfert et al., 2014) additionally propose the criterion of empirical engagement for distinguishing two primary research streams: the theoretical (oriented towards theorising, conceptualising, and possibly operationalising core issues) and the practical, which focuses on conducting empirical research to develop, verify and/or detail the theories of management sciences.

The criteria for distinguishing sub-disciplines are also influenced by the specific identity of management sciences (Trocki, 2005; Czakon, 2019). Since the discipline deals with the formation, operation, transformation, development, and interaction of organisations (Zakrzewska-Bielawska, 2012, p. 16), research work can be carried out on different levels of aggregation. Certo et al. (2010) pointed this out by distinguishing between research that is (1) primarily focused on individuals, teams, or groups (micro-level) and (2) primarily focused on organisations (meso-level). The macro level can further supplement this division, expressing research interest in inter-organisational relationships (Czakon, 2012) and even industry or sector-specific considerations.

Another important feature of management sciences is their relative youth and utilitarian nature, which translates into their greater dynamism than other scientific disciplines with already established traditions. Historically, management sciences began during the First and Second Industrial Revolutions (Turner, 2021). However, their evolution has under-

gone many phases (Lachiewicz & Matejun, 2012), conditioned strongly by technological development. This has enabled the development of simulation methods in management and is now increasing the importance of virtual organisations and remote management in digital environments (Vecchi et al., 2021; Durana et al., 2022). As a result, management becomes increasingly more virtualised, which leads to identifying reality as another criterion for subdividing sub-disciplines. In this case, management can be discussed in real, simulated, and virtual/digital environments.

A historical perspective on the development of management sciences also allows the introduction of two more criteria:

- prospects for development, associated with the tendency to raise the status of specific sub-disciplines and the emergence of new research specialisations within the management sciences (Kozłowski & Matejun, 2018, p. 140). Such an approach makes it possible, e.g., to distinguish declining, established, and emerging sub-disciplines;
- time, which refers to historical analyses (Agudelo et al., 2019; Wren & Bedeian, 2020) and discussions on future management trends (Tseng et al., 2019; Walker & Lloyd-Walker, 2019). This makes distinguishing such sub-disciplines as historical, contemporary, and future management possible. Based on the above criteria, specific classifications of sub-disciplines in management sciences can be applied in scientific and research practice. They can be analysed from the point of view of specific characteristics, such as:
 - application purposes, which may include, e.g., the separation and/or integration of the scientific community, the development of teams conducting research work, the evaluation of scientific activity carried out by higher education institutions, the identification of the activity profile and research interests of scientists, the conferment of specialisations within the framework of academic degrees, the distribution of funds for scientific research, the thematic classification of scientific journals and/or publications, support in the selection of journals in which management sciences researchers publish their research or the implementation of public statistics obligations;
 - impact range, for which national and international classifications can be distinguished;
 - number of classification levels adopted to distinguish sub-disciplines;

- number of distinguished sub-disciplines;
- embedding in a broader classification context. In this case, general breakdowns, which are part of broader classifications of areas, fields, and disciplines of science, can be distinguished from specific breakdowns, which are used exclusively to distinguish sub-disciplines in management sciences;
- openness to adding new sub-disciplines. In this case, open classifications, which assume the possibility of including additional sub-disciplines by the user, can be distinguished from closed classifications, which do not provide this possibility.

Based on a review of the literature and electronic sources, classifications in which specific sub-disciplines of management sciences are proposed include:

- the proposals of Sudoł, inspired by the work of the Committee of Organisation and Management Sciences of the Polish Academy of Sciences. In 2007, Sudoł (p. 43) distinguished four sub-disciplines of management sciences: (1) general theories of management, administration, and command, (2) management of economic organisations, (3) engineering management (production technology and processes), and (4) public management. He modified his proposal in 2014 by identifying three general specialisations: (1) theoretical foundations of management, (2) management in commercial organisations, and (3) management in public organisations. He further noted that as the management sciences develop, it will be helpful to distinguish more broadly ten specific sub-disciplines, including strategic management, human resources management, marketing, and quality management, and others (Sudoł, 2014, p. 31);
- the proposals of the Committee of Organisation and Management Sciences of the Polish Academy of Sciences (OM PAS). The first (version 1.0) was developed in 2014. It distinguished 21 sub-disciplines of management sciences based on a hierarchical arrangement of four levels: empirical nature, subject criterion, management level, and specific research specialisations (Cyfert et al., 2014). This proposal was subsequently modified in 2019 (version 2.0), considering the adaptation of sub-disciplines to systemic changes, the development of management theory and practice, and the strive to ensure the integrity of the entire discipline by integrating and eliminating existing sub-disciplines and organising their content. As a result, the number of specialisations was reduced to 18, each time justifying the changes and explaining them in detail (Belz et al., 2019);
- the proposal of the Committee of Economic Sciences of the Polish Academy of Sciences (Gorynia, 2013). It distinguishes six sub-disciplines in management sciences to determine the nature and distinction of this discipline within the field of economic sciences;
- the classification of sciences within the framework of panels of the National Science Centre (NCN Panels), Poland, which was developed for the qualification and evaluation process of research projects. It distinguishes three general panels: (1) HS — humanities, social sciences, and arts, (2) ST — science and technology, and (3) NZ — life sciences, followed by specific panels linked to scientific disciplines and particular research specialisations. Panel HS4 is interesting from the point of view of the management sciences as it includes Individuals, Institutions, and Markets, containing a classification of 15 sub-disciplines specific to economics, finance, management, demography, socio-economic geography, and urban planning. They include such sub-disciplines of management sciences as resources and sustainable development; corporate finance, accounting; consumption and consumer behaviour, marketing; strategic management, concepts and methods of management, logistics; human resources management, employment and wages, as well as public administration, among others. The classification is open, as other related topics can be reported in panel HS4_16;
- the 6-digit UNESCO nomenclature for fields of science and technology (1988), which distinguishes 24 various fields of science, including economic sciences (code 53), which are divided into 13 disciplines and 90 sub-disciplines. The specialisations of management sciences are primarily located in the discipline of “organisation and management of enterprises” (code 5311), where ten sub-disciplines have been distinguished along with the possibility of including additional proposals. However, individual sub-disciplines characteristic of management sciences are also present within other disciplines of economic sciences, e.g., technological innovation within “economics of technological change”; consumer behaviour within “general economics”; public enterprises within “industrial organisa-

- tion and public policy”, or international business within “international economics”. As a result, clear identification of sub-disciplines of management sciences is difficult, and for further consideration, the authors adopted 84 sub-disciplines of economic sciences (excluding six specialisations within the disciplines of “domestic fiscal policy and public finance” and “economic systems”);
- China’s current classification by the Academic Degrees Committee of the State Council (ADCSC Classification, 2018), which distinguishes five sub-disciplines within management sciences: (1) management science and engineering, (2) business management, (3) agriculture and forestry management, (4) public management and (5) library intelligence and archives management. Its primary purpose is to define specialisations within the framework of academic degrees and professional titles conferred in higher education institutions;
 - the code-based classification system of the Journal of Economic Literature (JEL Classification System..., 2022), developed by the American Economic Association as a standard method of classifying scholarly literature in the field of economics. This system is used to classify scientific papers, dissertations, books, book reviews, and working papers in economic literature. The system has undergone numerous changes over the years, and its current version includes three classification levels containing 20 categories at level 1, 122 two-digit codes at level 2, and 857 detailed three-digit codes at level 3 (Heikkilä, 2022). Because of the high complexity of the classification, the sub-disciplines of management sciences are placed in many different categories, with key ones being in the following categories: L — industrial organisation; M — business administration and business economics • marketing • accounting • personnel economics; O — economic development, innovation, technological change, and growth. The classification is open, as it is possible to include other research specialisations in each category;
 - the Fields of Research (FoR) classification under the Australian and New Zealand Standard Research Classification ANZSRC (2020), developed for use in the measurement and analysis of research and development (R&D) statistics. It includes a total of 23 science divisions, including division No. 35: commerce, management, tourism, and services. Within its framework, nine groups of scientific issues were identified. The sub-disciplines of management sciences are located in eight of them, excluding group No. 3508: tourism. A total of 75 sub-disciplines are distinguished here, along with the possibility of including additional proposals;
 - classification of the EURAM Strategic Interest Groups (2009), adopted within the European Academy of Management. It features an internal division of management sciences into 13 sub-disciplines including, but not limited to, business for society; corporate governance; entrepreneurship; gender, race, and diversity in organisations; managing sports; project organising; public and nonprofit management, as well as strategic management;
 - the Italian ANVUR classification (2015) used by the National Agency for the Evaluation of the University and Research Systems (Agenzia Nazionale di Valutazione del Sistema Universitario e della Ricerca). Its internationalised version prepared by the Consiglio Universitario Nazionale identifies six sub-disciplines of management sciences within the macro-sector No. 13/B: business administration and management, although from a substantive point of view, it is debatable to include among them the sub-discipline SECS-P/13 — commodity sciences;
 - the EIASM classification of domains of interest within the framework of the European Institute for Advanced Studies in Management. It is an internal division of economic sciences (including management sciences) into 112 sub-disciplines designated at two levels, including 18 at level 1 and 94 at level 2. The classification is open with the possibility of including additional proposals;
 - the classification of the European Group for Organisational Studies (EGOS classification). The organisation operates through dynamically functioning working units, the so-called Standing Working Groups (SWGs), carrying out research in a specific area. For the years 2021–2023, 15 SWGs have been designated, including organisation and time; organising in and through civil society: perspectives, issues, challenges; social evaluations in organisation studies; organisation(al) networks: between structure and process; organisational paradox: engaging plurality, tensions and contradictions; organising desirable futures: sustainable transformation, impactful scholarship and grand challenges; digital technology, media and organisation; institu-

Tab. 1. Divisions and Interest Groups of the Academy of Management

CAR Careers 897 Members	CM Conflict Management 654 Members	CMS Critical Management Studies 691 Members	CTO Communication, Digital Technology, and Organisation 1063 Members	DEI Diversity, Equity, and Inclusion 1911 Members	ENT Entrepreneurship 3502 Members
HCM Health Care Management 736 Members	HR Human Resources 3058 Members	IM International Management 1840 Members	MC Management Consulting 877 Members	MED Management Education and Development 1445 Members	MH Management History 377 Members
MSR Management, Spirituality, and Religion 576 Members	MOC Managerial and Organisational Cognition 1272 Members	OSCM Operations and Supply Chain Management 522 Members	OMT Organisation and Management Theory 3897 Members	ODC Organisation Development and Change 1579 Members	OB Organisational Behaviour 5711 Members
NEU Organisational Neuroscience 389 Members	ONE Organisations and the Natural Environment 858 Members	PNP Public and Nonprofit 685 Members	RM Research Methods 2320 Members	SIM Social Issues in Management 1914 Members	STR Strategic Management 5197 Members
SAP Strategising Activities and Practices 620 Members	TIM Technology and Innovation Management 3203 Members				
Micro cluster		Macro cluster		Meso cluster	

Source: elaborated by the author based on [https://aom.org/network/divisions-interest-groups-\(digs\)](https://aom.org/network/divisions-interest-groups-(digs)), 06.09.2023.

tions, innovation, impact: how institutional theory matters; as well as organising in and for extreme contexts;

- The Divisions and Interest Groups of the Academy of Management (DIG AoM) classification encompasses 26 specialisations integrating AoM members within individual teams. These areas are distinguished within specific clusters: (1) the micro cluster, which focuses on individual people; (2) the macro-cluster, focused on industries, markets, and professions; and (3) the meso cluster, which focuses on social structures and processes between micro and macro domains. Each DIG is characterised in detail within the so-called domain statements expressing the specificity of each research sub-discipline. This classification is closed, but changes do occur within it, particularly in the names of DIGs, which are related to the development of management sciences. Table 1 provides its current version with the number of members assigned to each DIG.
- the classification proposed by the Chartered Association of Business Schools (UK) within the

framework of the Academic Journal Guide 2021: Methodology (AJG 2021). Its goal is to support researchers in making informed and rational decisions when selecting journals in which they would like to publish research conducted in the domain of management sciences. The AJG 2021 list includes 22 subject areas dominated by sub-disciplines directly related to management sciences. However, there are also specialisations related to other scientific disciplines, such as psychology (general and organisational), regional studies, planning, and environment;

- the classification of Scopus-Elsevier (Scopus Sources), developed for the thematic classification of scientific journals. It lists 27 subject areas divided into specific research specialisations. From the point of view of management sciences, of particular importance is a set of 11 sub-disciplines in the area of Business, Management and Accounting, which include, among other things, business and international management, industrial relations, management of technology and innovation, marketing, or strategy and management;

- the classification of the Web of Science Journal Citation Reports (WoS JCR), used to qualify scientific journals into specific thematic groups. It includes 254 categories divided into 21 thematic groups. A catalogue of sub-disciplines characteristic of management sciences can be found in the “Economics & Business” group. It includes a list of 21 specialisations, with some relating to economics or other scientific disciplines (e.g., economics, demography, geography) and others being interdisciplinary in nature (e.g., area studies, ethnic studies, and urban studies).

The review of the literature and selected classifications presented above leads to the formulation of the research problem, which covers the identification and assessment criteria for the sub-division of management sciences sub-disciplines in national and international research practice. This research problem was operationalised into two research questions:

RQ 1: What sub-division criteria are used to distinguish sub-disciplines of management sciences in classifications of research specialisations? This question covers the analysis within a positive approach and identifies the key criteria of management sciences’ sub-discipline classifications.

RQ 2: To what extent are the criteria used to divide sub-disciplines in line with the expectations of the management sciences community? The second question refers to community evaluation of applying selected criteria in management sciences’ sub-disciplines classifications. Since its goal is to understand the alignment of classification practice with researchers’ preferences, it includes the analysis within a normative approach.

Such a defined research problem is essential to understanding the evolution and creating new opportunities for further development of management sciences because scientific sub-disciplines play an essential role in determining the scope and building the identity of management sciences (Kozmiński, 2007; Sudoł, 2014, p. 29). They also significantly determine the development prospects of this scientific discipline by strongly influencing the substantive scope, methodological rigour, and level of its internal integration and organisation (Kozłowski & Matejun, 2018). The research problem defined above also provides a better description and understanding of multi-paradigmatic, multi-disciplinary, and poly-methodological perspectives, which should be applied to management sciences, according to Sułkowski (2014).

2. RESEARCH METHODOLOGY

Aiming to achieve the paper’s purpose and answer the research questions, the authors conducted empirical research using triangulation (Easterby-Smith et al., 2021, pp. 253–254) of (1) document study (Lisiński & Szarucki, 2020, pp. 122–123) and (2) expert opinion survey (Bougie & Sekaran, 2020, pp. 126–127). The research was conducted during the Polish author’s research fellowship at Chongqing Jiaotong University, China. Therefore, the origin of experts involved in the study was intentional and resulted from scientific cooperation between authors. This approach allowed for including various national and international classifications of management science sub-disciplines in the research process and assessing whether the geographical context affects the diversity of expert opinions about criteria for classifying sub-disciplines of management sciences in research practice.

The document study employed the context and content analysis technique, and the sources of information were the 16 classifications of management sciences’ sub-disciplines characterised in the theoretical part of the paper. It aimed to identify the key criteria of management sciences sub-discipline classifications. The research tool was a control list consisting of 13 criteria discussed in the theoretical part of the paper. The research procedure was divided into three stages:

- stage 1 consisted of identifying and evaluating the sub-division criteria used in the 16 described classifications independently by each author of the paper. It was established that it is sufficient to identify at least one sub-discipline distinguished based on a particular criterion to consider that this criterion was used in a given classification;
- stage 2 involved consultation between the authors and subsequent formulation of an agreed list of criteria used in the sub-discipline classifications under consideration;
- stage 3 aimed to increase the validity and reliability of findings through substantive consultation with two independent experts representing the management sciences community. The final list of criteria used in the sub-discipline classifications under consideration was adopted on this basis.

Out of the analysed classifications, seven were general in nature. At the same time, nine were devel-

Tab. 2. Characteristics of the analysed sub-discipline classifications

CLASSIFICATION	COUNTRY / AREA	MAIN AIM(S)	SCOPE	LEVELS OF CLASSIFICATION*	NUMBER OF SUB-DISCIPLINES	BOUNDARIES
S. Sudot 2014	Poland	<ul style="list-style-type: none"> separation and integration of the scientific community development of research teams identification of research interests 	specific	1	10	close
OM PAS 2.0	Poland	<ul style="list-style-type: none"> separation and integration of the scientific community development of research teams identification of research interests 	specific	4	18	close
Econ PAS	Poland	<ul style="list-style-type: none"> separation of the scientific community 	specific	1	6	close
NCN	Poland	<ul style="list-style-type: none"> distribution of funds for scientific research 	general	3	15**	open
UNESCO	International	<ul style="list-style-type: none"> implementation of statistical obligations 	general	3	84**	open
ADCSC 2018	China	<ul style="list-style-type: none"> conferment of specialisations within the framework of academic degrees 	general	2	5	close
JEL	USA	<ul style="list-style-type: none"> classification of scientific publications in economic sciences 	specific	3	857**	open
ANZSRC 2020	Australia and New Zealand	<ul style="list-style-type: none"> implementation of statistical obligations 	general	3	75	open
EURAM	Europe	<ul style="list-style-type: none"> identification of research interests integration of the scientific community organisation of a scientific conference 	specific	1	13	close
ANVUR	Italy	<ul style="list-style-type: none"> evaluation of scientific and teaching activities 	general	3	6**	close
EIASM	Europe	<ul style="list-style-type: none"> identification of research interests 	specific	2	112**	open
EGOS 21–23	Europe	<ul style="list-style-type: none"> integration of the scientific community development of research teams 	specific	1	15	open
DIG AoM	USA	<ul style="list-style-type: none"> identification of research interests integration of the scientific community 	specific	2	26	close
AJG 2021	UK	<ul style="list-style-type: none"> support in the selection of scientific journals 	specific	1	22	close
Scopus	International	<ul style="list-style-type: none"> classification of scientific journals 	general	2	11	close
WoS JCR	International	<ul style="list-style-type: none"> classification of scientific journals 	general	2	21**	close

* In the case of general classifications, the number of levels of the entire classification is given.

** Including specialisations from other scientific disciplines, mainly economics.

oped only to distinguish sub-disciplines in management sciences (or in economic sciences in the case of the JEL classification). They contain research specialisations from min=5 to max=857. However, in some classifications, it was impossible to clearly distinguish research specialisations exclusively in management sciences. Hence, the given number includes sub-dis-

ciplines from other scientific disciplines, mainly economics. The hierarchical arrangement of the analysed classifications ranges from min=1 to max=4 levels of classification, and most of them (n=10) are closed and do not provide the possibility of adding other/new sub-disciplines to the proposed list. Detailed

characteristics of the analysed classifications are shown in Table 2.

The second part of the research was the expert opinion survey, which included representatives of the management sciences community from Poland and China. It aimed for community evaluation of the selected criteria application in management sciences' sub-discipline classifications. The sampling of respondents was intentional and purposive. Invitations were sent to the School of Economics and Management of Chongqing Jiaotong University staff, representatives of the Committee of Organisation and Management Sciences of the Polish Academy of Sciences, and scientists who expressed interest in the survey.

Communication with respondents was conducted via e-mail. A total of 80 e-mail invitations were sent to participate in the survey. A return of 33 questionnaires was received (a return rate of 41 %), but two were incomplete and were not included in the final sample. The final sample, therefore, included 31 responses, out of which 20 were from representatives of the management sciences community from Poland and 11 from China.

Therefore, the sample size meets the methodological requirements for expert research, requiring the size of the expert panel to range from about ten to about 50 participants (Shelton et al., 2018; Wuni & Shen, 2023). In addition, factors affecting the optimal expert sample size were considered, such as the homogeneity of the sample (researchers representing the same scientific discipline) and the study's exploratory nature. As Garson (2014) recommended, the sample size can be smaller in these cases.

The research technique was an e-mail survey, and the research tool was the authors' own expert questionnaire prepared in an MS Word document consisting of 12 questions and particulars. The experts received a certificate acknowledging their participation in the survey.

The group of expert respondents was dominated by senior academic staff members: full professors (seven) and associate professors (14). In addition, the survey included assistant professors (seven), two lecturers, and one assistant. The respondents represented various research interests, including, but not limited to, marketing, logistics, finance management, human resources management, entrepreneurship, strategic management, innovativeness, and public management. The period of their scientific activity was most often over 20 years (ten experts), as well as 6–10 and 11–15 years (seven experts for each range).

3. RESEARCH RESULTS

3.1. SUB-DIVISION CRITERIA IN INVESTIGATED CLASSIFICATIONS

The first part of the research involved identifying and evaluating the sub-division criteria used to distinguish sub-disciplines of management sciences in the 16 described classifications of research specialisations. As a result of the document research procedure, the final list of criteria used in the sub-discipline classifications under consideration was adopted, as presented in Table 3.

The results indicate that the most widely used criteria for dividing sub-disciplines (more than 80 % of the classifications analysed) are:

- resources, which are primarily due to the common distinction of the “human resources management” sub-discipline in the classifications analysed. Other sub-disciplines distinguished under this criterion include, e.g., “management of non-material resources” (Sudoł, 2014), “resources and sustainable development” (NCN), “resource management” (Econ PAS), and “manpower management” (UNESCO). The use of this criterion was not identified only in the ADCSC 2018 classification;
- areas of activity, referring substantively to the functions of enterprises and allowing to distinguish a broad and diverse range of sub-disciplines, including, but not limited to, “production management”, “logistics management”, “marketing management”, and “financial management”. The application of this criterion was not identified only for the Econ PAS and EGOS 21–23 classifications;
- concepts and methods of management, expressing the differentiation of sub-disciplines according to specific conceptual approaches, methods, and tools of management. In this case, the criterion was used to distinguish both general sub-disciplines, e.g., “methods and instruments of management” (Econ PAS), “concepts and methods of management” (NCN), as well as specific ones, including but not limited to “project management”, “innovation management” (ANZSRC 2020), “financial risk and risk management” (JEL), “organisational change”, “knowledge management” (EISAM) and “conflict management” (DIG AoM). The use of this criterion was not

Tab. 3. Distinction criteria used in the considered classifications of management sciences' sub-disciplines

CRITERIA	SCOPE OF USING	SUDOŁ 2014	OM PAS 2.0	ECON PAS	NCN	UNESCO	ADCSC 2018	JEL	ANZSRC 2020	EURAM	ANVUR	EIASM	EGOS 21-23	DIG AoM	AJG 2021	SCOPUS	WoS JCR
Areas of activity	14	+	+		+	+	+	+	+	+	+	+		+	+	+	+
Concepts and methods of management	14	+	+	+	+	+		+	+	+	+	+	+	+	+	+	
Empirical engagement	9	+	+			+		+	+	+		+	+				
Functions of management	5					+			+			+	+		+		
Geographic range	9				+	+		+	+	+		+		+	+	+	
Level of aggregation	11		+		+	+		+	+			+	+	+	+	+	+
Management level	12	+	+	+	+	+			+	+		+		+	+	+	+
Processes	7	+	+					+	+			+	+	+			
Prospects for development	1												+				
Reality	2												+	+			
Resources	15	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+
Time	7					+		+	+			+	+	+	+		
Type of organisations	14	+	+			+	+	+	+	+	+	+	+	+	+	+	+
NO. OF CRITERIA USED IN SPECIFIC CLASSIFICATION		7	8	3	6	10	2	9	11	7	4	11	10	11	9	7	5

+ means that the criterion was indicated in a specific sub-discipline classification

identified only for the ADCSC 2018 and WoS JCR classifications;

- type of organisations, which primarily distinguished “public management” or “management of public organisations” (Sudoł 2014, OM PAS 2.0, UNESCO, ADCSC 2018, or ANZSRC 2020). Other types of organisations include “small business management” (ANZSRC 2020, EIASM), “health care management” (DIG AoM, AJG 2021), “sports and leisure management” (ANZSRC 2020) or “financial markets and institutions” (ANVUR). Differentiation by type of organisation is particularly extensive in the UNESCO classification, which distinguishes ten sub-disciplines within area 5311: “Organisation and management of enterprises”, as well as 13 sub-disciplines within area 5312: “Sectorial economics” relating to enterprises in such industries as agriculture, forestry, fishing, energy, mining, research and development, trade and commerce,

or transport and communications. The use of this criterion was not identified only for the Econ PAS and NCN classifications.

It should be highlighted that clearly distinguishing sub-disciplines can be difficult based on the first three criteria. This is because the various sub-disciplines can intersect and overlap within each criterion. An example is “human resource management”, which can be considered both in terms of resources, as an enterprise function, and — in addition — as a formalised management concept (method). This problem is highlighted by Cyfert et al. (2014), who proposed the introduction of a three-dimensional matrix of sub-disciplines in strategic, operational, and functional terms, further expanded with the fourth dimension of organisation type. According to the authors, such a solution makes it possible to imaginatively create new analytical cross-sections and prospects for developing sub-disciplines, covering the broad context of management holistically and look-

ing for potential problems to analyse in scientific papers and projects.

Other commonly used criteria for dividing sub-disciplines (50 % – 80 % of the classifications analysed) include:

- management level, the prevalence of which (75 %) is due to the frequent distinction of the “strategic management” sub-discipline, as well as emphasising the strategic level of management in other sub-disciplines, e.g., “marketing management (incl. strategy and customer relations)” (ANZSRC 2020), “accounting & strategy” or “strategic human resource management” (EIASM). Furthermore, the analysed classifications distinguished the operational level of management (ANZSRC 2020, EIASM, DIG AoM, and sfdAJG 2021). However, the tactical level of management was not identified as a criterion for classifying sub-disciplines;
- aggregation level, which makes a distinction between micro-level sub-disciplines, relating, among other things, to “consumer behaviours” (UNESCO), “employee relations” (ANZSRC 2020), or “managerial cognition” (DIG AoM, EIASM); meso-level sub-disciplines, relating to entire organisations (OM PAS 2.0, NCN), as well as macro-level sub-disciplines, considering primarily “industrial relations” (EIASM, Scopus, WoS JCR). This criterion was particularly important in the EGOS 21–23 classification, where the names of sub-disciplines emphasised “occupations and professions” (micro level), “organisational, institutional implications” (meso level), as well as “organisational networks” (macro level), among other things;
- empirical engagement, which involves the distinction between theoretical and practical specialisations in management sciences. This criterion is strongly emphasised in Polish classifications Sudoł 2014 (as “theoretical foundations of management”) and OM PAS 2.0. (“organisation and management theory”). Similarly, theoretical sub-disciplines are distinguished in many theoretical streams of the UNESCO classification, in the ANZSRC 2020 classification (“marketing theory” or “organisation and management theory”), in EIASM (as “organisation theory”), in EGOS 21–23 (“SWG 12: Institutions, innovation, impact: How institutional theory matters”), as well as in DIG AoM (as “organisation and management theory”). The practical stream, on the

other hand, was emphasised in the JEL (“firm behaviour: empirical analysis”) and EURAM classification (as “research methods and research practice”);

- geographic range primarily associated with the distinction of specialisations emphasising the international scope of the considerations carried out. Examples include such sub-disciplines as “international business” (UNESCO, JEL, ANZSRC 2020, EIASM), “international management” (EURAM and DIG AoM), “international business and area studies” (AJG 2021) as well as “business and international management” (Scopus).
- Meanwhile, the following criteria for distinguishing management sciences’ sub-disciplines were used to the most minor extent (less than 50 % of the classifications analysed):
- time, which mainly emphasised sub-disciplines related to the past of management sciences, e.g., “business and labour history” (ANZSRC 2020), “micro-business history” (JEL), “accounting history” (EIASM), “management history” (DIG AoM) or “business and economic history” (AJG 2021). Challenges related to the development of research specialisations in management sciences over time were also identified in “SWG 01: Organisation and time” under the EGOS 21–23 classification;
 - processes, which were directly emphasised primarily in Polish classifications by Sudoł (2014) as “management of production technology and processes” and OM PAS 2.0 as “process and project management”, as well as in the EGOS 21–23 classification as “SWG 07: Organisation(al) networks: Between structure and process”. Because of the close substantive relationship between the concepts of process management and supply chain management (Mc Loughlin et al., 2023), specialisations distinguished based on this criterion also included “supply chains” (ANZSRC 2020), “supply chain management” (EIASM) and “operations and supply chain management” (DIG AoM). The JEL classification, on the other hand, distinguishes “processes of innovation and invention” as a research specialisation;
 - functions of management, for which sub-disciplines have been identified that relate to both planning, e.g., “organisational planning and management” (ANZSRC 2020), organising, e.g., “organisation of production” (UNESCO),

“organisational studies” (AJG 2021), leading, e.g., “leadership” (ANZSRC 2020), as well as controlling, e.g., “audit & control” (EIASM);

- reality, which emphasised the digital and virtual dimensions of research specialisations in management sciences. Only two sub-disciplines have been identified on this basis: “SWG 11: Digital technology, media and organisation” under the EGOS 21–23 classification, as well as “communication, digital technology, and organisation” under the DIG AoM classification;
- prospects for development, for which only one research specialisation has been identified, “SWG 10: Organising desirable futures: sustainable transformation, impactful scholarship & grand challenges”, under the EGOS 21–23 classification.

In addition to the wide range of criteria used to distinguish sub-disciplines, the dynamic nature of the analysed classifications is also noteworthy. Indeed, a significant part of them has been modified in recent years to adapt them to current and prospective development directions in management sciences. Examples of these changes include the update of Polish OM PAS 2.0 classification due to system changes in 2019, new versions of the ADCSC 2018, ANZSRC 2020, and AJG 2021 classifications, the introduction of an additional level of micro-, meso- and macro-clusters

in the DIG AoM classification, as well as dynamic thematic changes in the EGOS 21–23 classification.

3.2. SUB-DIVISION CRITERIA IN EXPERT REVIEW

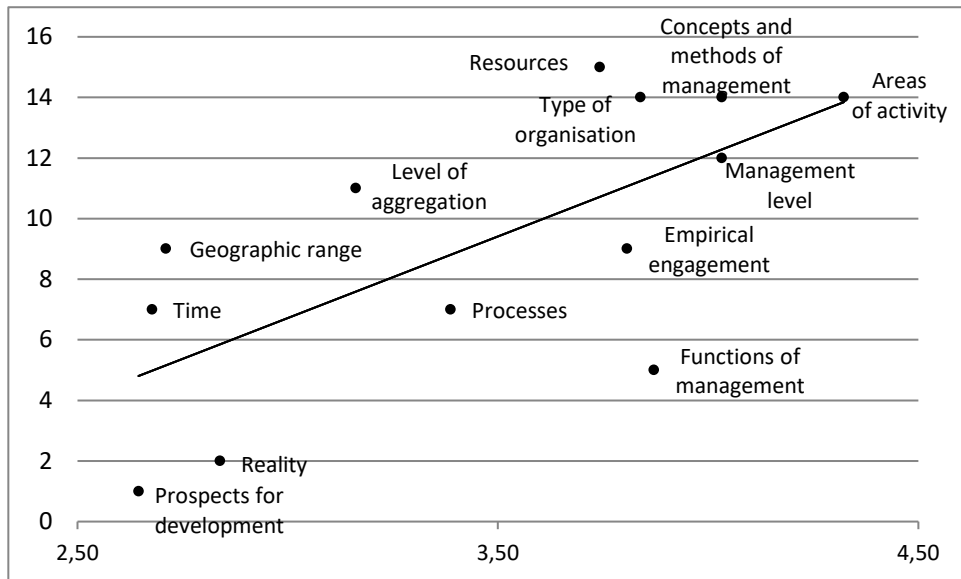
In the second part of the research, respondents from Poland and China were asked to evaluate the usefulness of each criterion for distinguishing management sciences’ sub-disciplines in research practice. Experts rated the usefulness of each criterion on an ordinal Likert scale ranging from 1 (very low usefulness) to 5 (very high usefulness). In addition, they had the option to include additional criteria, yet it was not used. A comparative analysis of the average indications of Chinese and Polish respondents was also conducted. Because the assumptions about the normality of the distributions of the individual variables were not met, a nonparametric Mann–Whitney U test was used for this purpose. The results obtained (overall and from each country) are shown in Table 4.

Respondents found the following criteria to be the most valuable (average score above 4): (1) areas of activity, referring substantively to the division according to the function of an enterprise; (2) management level, related to distinguishing the strategic, tactical and operational levels of management, and (3) con-

Tab. 4. Respondents’ evaluation of the usefulness of the criteria for distinguishing management sciences sub-disciplines

CRITERIA	MEAN OF RESPONSES FROM RESPONDENTS			U MANN–WHITNEY	MEAN RANK	
	IN TOTAL	FROM CHINA	FROM POLAND		FROM CHINA	FROM POLAND
Areas of activity	4.32	4.64	4.15	72.5	19.41	14.13
Concepts and methods of management	4.03	4.18	3.95	100.5	16.86	15.53
Empirical engagement	3.81	4.36	3.50	60*	20.55	13.50
Functions of management	3.87	4.45	3.55	59*	20.64	13.45
Geographic range	2.71	3.82	2.10	15.5**	24.59	11.28
Level of aggregation	3.16	3.91	2.75	48.5**	21.59	12.93
Management level	4.03	4.18	3.95	96.5	17.23	15.33
Processes	3.39	3.55	3.30	93	17.55	15.15
Prospects for development	2.65	3.27	2.30	57*	20.82	13.35
Reality	2.84	3.09	2.70	91	17.73	15.05
Resources	3.74	3.64	3.80	95.5	14.68	16.73
Time	2.68	3.45	2.25	54.5*	21.05	13.23
Type of organisation 3.84		4.09	3.70	87.5	18.05	14.88

*p < 0.05; **p < 0.01.



X-axis: Respondents' evaluation of the usefulness of the criteria for distinguishing management sciences' sub-disciplines
 Y-axis: The scope of using a specific criterion in classifications of management sciences sub-disciplines under consideration

Fig. 1. Correlation of the extent of use of each criterion in the classifications analysed with the evaluation of experts

cepts and methods of management, expressing the conceptual richness of management sciences. The second group comprises criteria with above-average usefulness (average score above 3, up to 4), which include: (4) functions of management, (5) type of organisation, (6) empirical engagement, (7) resources, (8) processes, and (9) level of aggregation. They provide an opportunity to deepen and diversify the classifications by introducing several specific research specialisations. The last group consists of criteria with below-average usefulness, which include (10) reality, (11) geographic range, (12) time, and (13) prospects for development. The low ratings indicate the respondents' limited recommendation to use these criteria in research practice.

The results show that Chinese respondents rated the usefulness of most criteria slightly higher. However, there were no statistically significant differences in the evaluation by Chinese and Polish respondents for the group of the most valuable criteria. Such differences were identified for six criteria in the groups with above-average and below-average usefulness: empirical engagement, functions of management, level of aggregation, geographic range, prospects for development, and time. This means the respondents generally agreed when evaluating the principles for creating a classification of sub-disciplines in management sciences.

The final part of the research evaluated the extent to which the criteria used to divide sub-disciplines align with the expectations of the management sciences community representatives from Poland and China. This was achieved using the correlation of the extent of use of each criterion in the classifications analysed with the respondents' evaluation, as shown (along with the trend line) in Fig. 1.

The results indicate that, in general, the extent of application of each criterion in the compared classifications is mainly consistent with the survey participants' evaluation of its usefulness, $r_{xy}(n=13) = 0.69$. Based on the detailed results, it can further be concluded that the extent to which each criterion is applied in research practice is slightly more in line with the expectations of representatives of the management sciences community from Poland, $r_{xy}(n=13) = 0.67$, than from China, $r_{xy}(n=13) = 0.58$.

4. DISCUSSION OF THE RESULTS

The research allows for answering the initial research questions:

RQ 1: What sub-division criteria are used to distinguish sub-disciplines of management sciences in classifications of research specialisations?

A wide variety of criteria can be used to distinguish research specialisations in management sciences. The results showed that the following criteria play a leading role in the analysed classifications: (1) resources, referring to the resource-based view in management (Barney et al., 2021); (2) areas of activity, substantively related to specific functions of enterprises (Misiński, 2021, p. 43), (3) concepts and methods of management, expressing the diversity of conceptual approaches, methods, and tools of management (Szymańska, 2021), emphasised, e.g., by the “management theory jungle” metaphor (Brunsson, 2021), and (4) types of organisations, highlighting subject diversity in research conducted within management sciences (Farah et al., 2020).

The second group consists of criteria that allow additional, specific types of research specialisations to be introduced into the analysed classifications. Using the management level criterion, mainly the strategic and operational context of managerial activity was distinguished (Berisha-Namani, 2010); on the other hand, the level of aggregation criterion allowed for distinguishing sub-disciplines relating to individual people, such as employees, consumers, managers (micro level), whole organisations (meso level), as well as inter-organisational, network or industry relationships and relations (macro level), which fits in with the concept of three levels (scales) in social analyses (Serpa & Ferreira, 2019), as well as the basic assumptions of analyses within the framework of institutional theory (Van Wijk et al., 2019). The empirical engagement criterion mainly emphasised the theorising and theoretical nature of the considerations underpinning the development of management sciences and their respective sub-disciplines (Brunsson, 2021), while the geographic range criterion mainly highlighted the international scope of the considerations (O’Higgins et al., 2021). Meanwhile, criteria for distinguishing sub-disciplines used to the least extent include time, processes, management functions, reality, and prospects for development.

Interestingly, the vast majority of key identified criteria are specific and characteristic for management sciences only (e.g., resources, areas of activity, type of organisations, management level, and aggregation level). This indicates the important role of the sub-disciplines distinguished on their basis in building a strong and forward-looking identity for management science. After a suitable adaptation, some criteria (concepts and methods, geographic range, and the level of aggregation) can be successfully used to classify research specialities within other scientific

disciplines. However, universal criteria (empirical engagement, prospects for development, and time) that can be used successfully to distinguish sub-disciplines in other knowledge domains were identified to a much lesser extent.

RQ 2: To what extent are the criteria used to divide sub-disciplines in line with the expectations of the management sciences community?

The results indicate that the criteria used to divide sub-disciplines are well in line with the expectations of the representatives of the management sciences community who participated in the survey. This is confirmed by the high convergence of the experts’ evaluations of the practical usefulness of each criterion with the extent of its use in the analysed classifications. Based on the comparison of the results with the trend line, it can also be concluded that in the case of five criteria, i.e., (1) prospects for development, (2) reality, (3) processes, (4) empirical engagement, and (5) functions of management, experts expect them to be used for distinguishing research specialisations to a slightly greater extent than is apparent from the current practice of the analysed classifications.

The considerations are a part of the current and prospective discussion of the past and future and promising research specialisations within management sciences (Wang, 2022; Bylund & Packard, 2022; Redgrave et al., 2022). The results also play an essential role in the process of emergence, constitution, and development of new sub-disciplines. As examples of such trends, one can point to calls for the separation of such research specialisations as arts management (Evrard & Colbert, 2000), sports management (van der Roest et al., 2015), lean ergonomics (Brunner et al., 2022), or even logistics 4.0 (Szymańska et al., 2017).

Changes in this area are evolutionary rather than revolutionary, always involving in-depth substantive debate and challenges to existing paradigms (Boyd et al., 2005, p. 240). However, the results confirm that these changes occur and influence the development of management sciences, as evidenced by the dynamic nature of the analysed sub-discipline classifications. This problem is considered particularly by Sudol (2019), who encouraged reasonable restraint in introducing new research specialisations and limited their excessive number. According to him, excess research specialisations could lead to the disintegration of management sciences and its degradation as a scientific discipline. It would negatively affect the quality of student education. This should be countered by

establishing research specialisations as part of the sub-disciplines, encouraging the lively cooperation of research workers from individual disciplines and research specialisations, and not neglecting theoretical studies in management.

The results are also highly useful in the process of reviewing and/or placing particular research issues or problems in specific sub-disciplines of management sciences. This approach represents a vital stream of theoretical and empirical considerations, as exemplified by the research on lodging-related organisations and the lodging industry, which analysed the issue under consideration in relation to 15 sub-disciplines of management sciences (Okumus et al., 2018), as well as the work by Caruana et al. (2021), who analysed the phenomenon of modern slavery in the context of six sub-disciplines. As for other instances, Stefanidis et al. (2022) considered the 25-year development of management research on poverty from the perspective of nine research specialisations, while Dey et al. (2020) evaluated critical research and entrepreneurship in terms of five sub-disciplines of management sciences based on 151 scientific papers.

Thus, the conclusions of the discussion indicate the importance of considering the refinement of sub-discipline classifications in the development of management sciences. However, when considering the conclusions of the empirical analyses, it is also important to consider the limitations of the conducted research (Geletkanycz & Tepper, 2012). First and foremost, these include the subject scope, which was limited to 16 classifications of management sciences' sub-disciplines and a sample of 31 representatives of the scientific community from Poland and China. Efforts were made to limit the potentially negative impact of these factors by selecting sub-discipline classifications originating from different countries and developed for various practical applications (including the evaluation of scientific activity, distribution of funds for research work, implementation of statistical obligations, or integration of the scientific community). In the case of the expert survey, efforts were made to involve key representatives of the management sciences community, including, among other things, representatives of the Committee of Organisation and Management Sciences of the Polish Academy of Sciences. Another limitation may be the subjectivity of assessments in the document and expert research. In the case of the document study, an effort was made to minimise this adverse impact by using a 3-stage research procedure that included inter-researcher agreements and external

consultations with independent experts representing the scientific community. On the other hand, the expert survey used a standardised survey questionnaire in English, which positively reduced the potentially adverse impact of the linguistic interpretation of the questions.

CONCLUSIONS

Sub-disciplines are crucial in building the management sciences community's identity, organisation, and development. They are distinguished based on specific criteria, the selection and application of which determine the practical usefulness of the created classifications.

The theoretical considerations and the research results indicate that national and international classifications of management sciences' sub-disciplines are created based on various criteria. The following criteria play a crucial role: (1) resources, (2) areas of activity, (3) concepts and methods of management, and (4) types of organisations. They were used in most (more than 80 %) studied classifications, laying the conceptual and logical foundations for their creation and further development.

An important role is also played by supplementary criteria, which include (5) management level, (6) aggregation level, (7) empirical engagement, and (8) the geographic range. They enable deepening the classification by adding more specific research specialisations. In contrast, the following criteria were used to a lesser extent (less than 50 %) in the classifications studied: (9) time, (10) processes, (11) functions of management, (12) reality, and (13) prospects for development. The results showed that the surveyed experts rated most of their usefulness slightly higher than initially appeared from the current practice of the analysed classifications. In general, however, the extent of the use of the analysed criteria was well in line with the expectations of the representatives of the management sciences community participating in the survey.

Therefore, the scope of analysis to solve the set research problem contributed to both approaches to considering sub-disciplines of management science: positive (how it is) and normative approach (how it should be). Explorations in the field of the positive approach made it possible to identify key criteria for distinguishing sub-disciplines in national and international classifications of management sciences.

Analyses within the normative approach, on the other hand, allowed for assessing the alignment of the preferences of the scientific community representatives with the extent to which specific criteria are used for classifying the specialities of the management sciences.

The dynamic nature of the development of the discipline and sub-disciplines of management sciences indicates the need for continued research on the purposes, principles of development, logic for distinguishing, and substantive scope of the classification of research specialisations. Potentially interesting and promising future research directions in the field of management sciences' classification include:

- creative discussions and creative sessions directed at identifying new criteria that can be used in classifications of management sciences' sub-disciplines,
- contextual analyses (e.g., by location, position in the scientific community) of perceptions of the particular criteria usefulness by representatives of the management science community,
- longitudinal studies to identify development trends in the area of new management sciences' sub-disciplines emergence and development,
- analyses aimed at challenges and prospects of defining the thematic scope of sub-disciplines and their impact on the development of management sciences in the long term.

Therefore, there should certainly be a discussion in the scientific community on improving and further developing the classifications of management sciences sub-disciplines in theory and research practice.

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