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Review

The Story of Futures Studies: An Interdisciplinary Field Rooted in Social Sciences

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Abstract: This article presents the almost century-long history of the development of futures studies in a comprehensive review. Futures studies, rooted in sociology and policy sciences, had become an academic discipline by the 1960s. One of the major global communities representing the discipline, the World Futures Studies Federation (WFSF), celebrates its 50th anniversary in 2023. In the 1970s, the focus was placed on discourses on global problems and preferred futures. Futures studies then developed a global institutional community and become a mature discipline by the 1980s and 1990s. Futurists by then had already mutually shared theoretical perspectives, objectives, ethics, and methods, and had produced empirical results. A wide range of comprehensive publications at that time synthesized the foundations and preceding results of futures studies. From the turn of the millennium, active discourse took place on the forthcoming role of futures studies. By that time, the theoretical, methodological, and practical knowledge foundations of the discipline had also appeared in internationally well-documented curricula. Since around 2010, the discipline has been characterized by the development of practical foresight projects. Based on notable trends and identified research gaps, this article formulates up-to-date expectations and research directions within which futures studies might develop in the future.

Keywords: futures studies; foresight; futures thinking; development history; literature review

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1. Introduction

Even though futures thinking has always comprised part of human history, scientific-based futures studies initially evolved in the 20th century. Rooted in sociology and policy sciences, futures studies had become a generally accepted academic discipline by the 1960s when it became unequivocally visible in the international scientific community. The most prominent global federations and prestigious scientific journals were mostly founded in this era. Doctoral- and master-level education programs in futures studies were also launched at that time. In the subsequent period, the focus was placed on future discourses concerning global problems, and futures studies became an integrated element of strategy formulation in practice.

By the 1980s and 1990s, futures studies had advanced to achieve a global, institutional, systemically embodied status and had become a mature discipline. By then, futurists already possessed global-level, mutually shared theoretical concepts, objectives, ethics, methods, empirical results, and communities. A wide range of comprehensive publications also synthesized the preceding results of futures studies research projects. By the 2000s, the theoretical, methodological, and practical knowledgebase of the discipline had also appeared in internationally well-documented curricula. Moreover, active discourse began to be placed on the future role of futures studies. The period since 2010 has been mostly dominated by the implementation of multiple and diverse foresight projects.

To provide a state-of-the-art definition of the discipline, futures studies can be described both as an art and as a science with a strong emphasis on imagination and creativity in developing different possible futures (Motti 2022). Its fundamental objective is to explore and master complex chains of cause and effect through conceptualization, systemic approach, and feedback loops, thereby ultimately providing social and technological innovation (Motti ibid.).

The objective of this article is to provide a comprehensive review of the approximately century-long history of the development of futures studies by examining transparently available results in the most influential scientific publications over the entire period. The article also identifies future research directions based on the explored research trends and gaps.

By considering the extent of available publications in journal articles, entire books, book chapters, volumes, and proceedings in order to elaborate a comprehensive history of development, it can be determined that, to this point, more than a hundred thousand sources have been accumulated in the field of futures studies, and it is increasingly broadening. Thus, given such an immense range of sources, it is not possible to examine every single item in the scope of this article.

The authors have, therefore, performed a systematic literature review in order to prepare an evaluation of international development history. In recent decades, futurists and related scholars dealing with forward-looking activity (FLA) research have produced a rich set of scientific results reflected in respectable publication performance. In order to gain a comprehensive picture, the most important findings of the most relevant publications have been systematically evaluated.

By applying a classical systematic literature review approach, a keyword search was initially performed in Crossref by using the terms 'futures studies', 'history', and 'review'. Keyword selection adequately served the objectives of the research. This was carried out using Harzing's Publish or Perish platform (Harzing 2007). The first thousand results were then taken into account for consideration. The objective was to identify the most influential publications from the viewpoint of development history based on the located ranks and citations produced by Crossref. Figure 1 illustrates the filtering and ranking process.

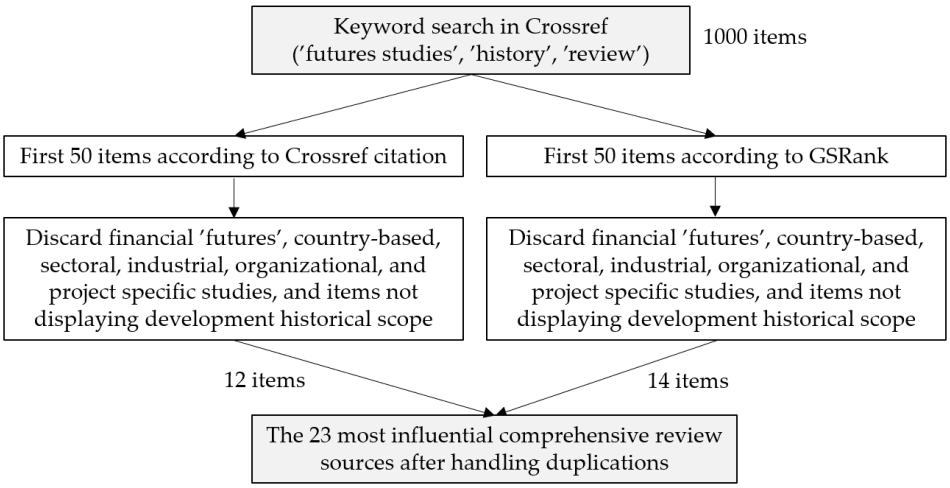

Figure 1. The process of the systematic literature review.

The results revealed that an extensive set of even review articles, books, and specific chapters were available in the field of futures studies. The applied platform has facilitated the ranking of the sources both per Crossref citation and Google Scholar Ranking (GSRank). The first fifty items of each have been considered in two steps. In order to reduce the list to concentrate on highly influential and comprehensive publications on futures studies, the authors discarded those possessing the 'futures' topic within the fields of finance, country-based, sectoral, industrial, organizational, or project-specific studies. Short articles and

theoretical or methodological publications not displaying historical developmental scope, were also excluded. As a result, twelve publications remained in the Crossref citation line and fourteen in the GSRank line. It was interesting to conclude that only three overlapping sources were present in the shortlist. Handling the duplications, the shortlist consisted of twenty-three publications.

Based on the final shortlist, it was determined that items classified under in-depth investigation were mainly review articles published in high-ranking scientific journals from the turn of the millennium. Particular attention was paid to the extraordinarily detailed historical review article by Son (2015), the paradigm-based evolutionary review article by Kuosa (2011), and the comprehensive bibliometric review article by Fergnani (2019), which identified research trends, clusters, gaps, and future research directions.

It has to be remarked, however, that this process has limitations. Non-English publications are not found through English keyword searches, whereas substantial publications in the field of futures studies are available inter alia in Spanish, Chinese, or French. The Crossref search builds upon digital object identifier (DOI) codes. Publications without DOI codes are left out of the search, akin to older publications for which DOI codes were not retrospectively registered.

After analyzing the sources, we decided to evaluate the development history in a 'review of reviews' approach. It has also become evident that several bestseller review publications (primarily books and volumes) already appeared in the field of futures studies before the existence of the current widely applied bibliometric databases serving as a basis for systematic literature reviews. Therefore, the selected outstanding publications of the most renowned authors in the field of futures studies have been directly processed and referred to in this article.

Systematic literature reviews are widely completed using a thematic approach. However, as four thematic review articles were published in this field in recent years—Fergnani (2019) about general futures studies based on the top ten journals, Saritas et al. (2022) about foresight via science mapping, Marinković et al. (2022) about corporate foresight, and Amini et al. (2021) about regional foresight—we decided to follow a different approach.

Hence, we attempted to follow a chronological pattern when evaluating historical development milestones. Accordingly, this review article is organized into three sections: the origins of futures studies in the early 20th century to the 1960s; the period between 1970 and 2000; and, finally, the 21st century. However, it does not necessarily follow that the referred sources also follow a chronological order, as, in several cases, retrospective review articles, books, and volumes have been referred to which were published after actual incidental events took place.

Three historical aspects can shed light on the way futures studies developed throughout history: firstly, academic journals covering systems thinking since the 1950s; secondly, academic courses in futures thinking that were offered in a variety of other disciplines; thirdly, futures studies programs that are available worldwide. For this, there are repositories that are constantly updating their materials, thereby enriching the knowledge base of futures studies.

2. From the Origins of Futures Studies to Becoming an Academic Discipline in the 1960s

Based on the record of historical publications, it can be argued that the initial scientific exploration of the future was accomplished by sociologists. Sociology emerged and demonstrated its scientific features in the first half of the 19th century, mainly owing to the pioneering work of Comte. In an in-depth review of publications authored by social and natural scientists dealing with the future, Winthrop (1968) interpreted futures studies as a novel sub-discipline of sociology. Huber and Bell (1971) approached the rise of futures studies as the future of sociology. Bell and Mau (1971) drew attention to the efforts of sociologists to give priority to futures studies. However, as a result of enduring discussions, such scientific debates were ultimately concluded in the mid-1990s. Accordingly, futures

studies, although rooted in sociology, gradually became an identical discipline. It then diverted from mainstream sociology for a long period for several demonstrated reasons, whereas sociology had to reconsider its relationship to the future (Bell 1996).

In accordance with the previous observations, and based on publication activity from the 1910s, the American sociologist Gilfillan, can be regarded as one of the most influential founders of futures studies. In direct antecedence to the prevailing scientific environment at that time, Gilfillan proposed a case for inter-disciplinarity, outlining the necessity of formulating alternative scenarios based on a broad knowledge of history and arguing for the cautious consideration of extrapolations (Ballandonne 2020). The evaluation of future social changes was regarded as the 'sociology of inventions' (Gilfillan 1935). In parallel, another pioneering American sociologist, Ogburn, extensively analyzed social trends and the role of technology in social changes by preparing a conceptual and methodological foundation for technological innovation analysis (Ogburn 1933). This approach emphasized that a society should continuously provide a quantitative picture of itself from which it can be discerned how it developed from which point and the location of the decisions necessary to obtain a more favorable stage in a decades-long perspective. This approach is still valid at this time.

Another originator of futures studies was the American policy scientist Lasswell, who elaborated a notable futures thinking method in the subsequently widely applied 'developmental construct' approach (Lasswell 1948). The establishment of the so-called 'garrison states' was formulated not as a forecast but as an image of the future (Lasswell 1941). In a later study, Lasswell (1971) explored possible and probable futures presuming the continuation of recent policies and argued for the enactment, evaluation, and selection of policy alternatives, whereby preferred futures could be accomplished in society. Based on historical experiences, however, it can be concluded that futures studies did not become a part of political sciences either, mainly because policies typically focus on the short-term, whereas futures studies focus on the longer-term (deLeon 1984). Furthermore, policy scientists often 'defuturize' the future to enhance security, which is also due to the presumed expensive feasibility of preferred changes (Polak 1961).

National planning systems also provided significant added value to the foundation of futures studies. Following World War I, developed countries established regular capacities to plan for the future (Masini 1993). Over the longer-term, systematic thinking about the future in national planning systems was accomplished in capitalist countries throughout the period of recovery following the global crisis in the 1930s. By contrast, in communist, fascist, and national socialist countries, this process manifested in economic and political expansion in the 1930s. It subsequently ensued in economic mobilization during World War II and in the post-war national economic planning efforts by looking forward several years (Bell 2003). In parallel, system analysis and cybernetics had a substantial impact on futures studies, especially in the United States (US) (Slaughter 1995).

From around the end of World War II, a futurology approach unfolded in Europe as a means of studying the future (Flechtheim 1966). Futurology was regarded as a systematic discipline incorporating prognosis, projection, linear programming, planning, and target setting for the future (Flechtheim 1967). However, the application of the term 'futurology' significantly declined in subsequent years, as futurists globally emphasized the importance of multiple alternative futures together with the construction of possible and preferred futures, as opposed to probability-based predictions with limited usability (Bell 2003). The plural form of 'futures' was thereafter conclusively important in order to emphasize both the denomination and practice of the discipline (Sardar 2010).

It has to be emphasized that futures studies developed in several non-English speaking countries and took different paths and historical contexts. It added an idiosyncratic global dimension to the discipline; however, it also meant that many publications in these countries were not written in English. In Eastern European countries, the term 'prognostics' became widely applied to entail all human activities focusing on forecasting and foresight (Rolbiecki 1967). The roots of prognostics can be traced back to economic

forecasting (Morgenstern 1928). Futures studies in European socialist countries subsequently followed a different development path from their counterparts in Western countries (Nováky et al. 2001). In contrast, futures studies in France at that time represented a different development history from futurology and prognostics and followed a 'la prospective' approach with features of scenario planning (Godet 1986). Futures studies in Latin American countries were initiated with a linear conception of reality, supported by the mathematical principles of probability (Mojica 2010).

The period between World War II and the 1960s largely concerned the rationalization of futures thinking by underpinning the science of forecasting and the professional knowledge base of futures studies (Cornish 1977). Scientific inquiries into the future strengthened from this process. The systematic exploration of futures derived from technological forecasts was also accomplished (Son 2015). Up to that point, scientific futures studies had broken away from the discussion of utopias, prophecies, sci-fi, religious attitudes, and other mystical ideas that had been previously often integrated with scientific futures thinking. Following World War II, futures studies attempted to define its relevant research questions based on the relationship between Western and non-Western cultures (Sardar 1993). Western societies achieving rapid economic growth deemed futures studies as the prime field within which to identify novel markets and to more effectively manage portfolios (Son 2015). Futures studies was also influenced by military strategic thinking, which was common in the Cold War era. This was manifested in the US by the growing demand for methodologies that could support complex forecasting and planning activities (Tolon 2012). Later research revealed tensions between expected results from technological development and actual realities by drawing attention to techno-optimism as a past future (Corn 1986).

The discipline of historicist philosophy of science also had an impact on modern futures studies. According to Popper (1957), historicism formed the approach of social sciences, whereby the final objective was to predict history, which could be achieved by exploring intrinsic rhythms, patterns, laws, and trends residing in history. Although several critiques at that time affected even mainstream scientific predictions, futures studies merely concentrated on technological and economic forecasting (Goldthorpe 1971). Deterministic and evolutionary development tendencies considered by futures studies altogether met requirements amid the then prevailing historicist circumstances. However, making scientific predictions surely cannot be regarded as equal to futures studies (Kristóf 2006).

By the 1950s, the American RAND Corporation became the leading institution for futures thinking. RAND adopted operational and armament technocratic forecasting practices developed in World War II. All products, policy alternatives, new ideas, long-term plans, proposals, warnings, forecasts, etc., produced by the company were related to futures thinking (Jardini 2013). RAND also elaborated the systematic foundation of expert opinion-based methods in forecasting, from which the Delphi method is widely applied to the present time (Dalkey and Helmer 1963). The publications of Kahn (1960, 1962) can be regarded as the first applications of scenario planning in futures studies, in which alternative consequences of nuclear conflict were explored. RAND scenarios, therefore, had significant policy implications.

The development of futures studies from philosophy of science viewpoints following World War II was discussed in depth by Masini (2006). Futures thinking was interpreted as constituting visioning, whereby the development of capacities and values was essential when addressing qualitative, human, and social issues. Special emphasis was accordingly given to the responsibility of futurists, given that they comprise a part of the world under examination. Futures thinking was thus regarded as a learning process. Malaska (2001) identified futures studies as a value-related field, which can be contrasted with normal sciences with the aim of value neutralism.

Modern futures studies became visible in the international scientific community in the 1960s. Polak (1961) explored the rise and fall of civilizations with the help of future images and outlined the importance of social future-shaping capacities. A major publication by Carson (1962) was epoch-making not only in the field of futures studies but also in

terms of the establishment of the environmental movement. Gabor (1963) produced the statement that the future cannot be predicted, but different futures can be invented, which is valid to this present time. McLuhan (1964) elaborated on the theoretical underpinning of how technologies change the cognitive interpretations of humanity. De Jouvenel (1967) then summarized the fundamental principles of futures studies for the first time in a comprehensive publication and elaborated its normative elements in order to create a preferred life in future societies. In terms of representing critical futures studies, Jungk, Flechtheim, and Galtung elaborated on the academic foundations of peace and conflict studies within the framework of multiple publications (Brassett and O'Reilly 2021).

Futures studies also became an empirical research field in the 1960s. Largely due to the activities of RAND and work by Kahn (1960, 1962) and Kahn and Wiener (1967), futurists increasingly applied scenario planning, Delphi, game theory, computer simulations, and technological forecasting methods. Technological forecasting and related futures methods in the field of strategic analysis were reviewed in depth by Millett and Honton (1991). Numerous studies have been published in recent decades on the governmental, industrial, innovation, corporate, and academic application of technological forecasting methods (Son 2015). Technological forecasting in particular can be regarded as a systematic long-term forecasting technique that aims to determine the most probable technological developments by rationalizing future-oriented human activities (Cornish 1977).

Modern futures studies subsequently had to respond to the challenges of rapid and complex changes (McHale 1969). According to Berger (1964), the faster a car is driven, the longer its headlamps should be lit to mitigate risks. It thus follows that futures studies should look forward to even longer-term perspectives in relation to frequent and deep societal changes.

The establishment of professional world federations was a clear signal of the wider impact of the discipline. The World Future Society (WFS) was founded in 1966, and the founders of the World Futures Studies Federation (WFSF) held their first session in Oslo in 1967 to eventually establish the WFSF in 1973. In 1977, the WFS reported considerable scientific results, and an exponentially growing community of futurists also emerged, together with a detailed evaluation of affected futures topics, methods, case studies, and organizations (Cornish 1977). Some decades later, the Association of Professional Futurists (APF) was established in 2002 to represent practitioners and emerging futurists.

Throughout the history of development, the two most consistently influential scientific journals were launched with *Futures* in 1968 and *Technological Forecasting and Social Change* in 1969. Both journals have attained prestigious Scopus and Web of Science (WOS) classification statuses. Subsequently, the significance of the *Journal of Futures Studies* (founded in 1996), *Foresight* (first released in 1999), and the *European Journal of Futures Research* (issued since 2013) can also be highlighted. These journals have continuously documented the development; results; and theoretical, methodological, and practical problems related to the discipline. Further substantial futures studies products have been published inter alia by the *International Journal of Forecasting*, *Long Range Planning*, *Journal of Forecasting*, *World Futures Review*, *Futures Survey*, *Policy Futures in Education*, *On the Horizon*, *The Futurist*, *Futures Research Quarterly*, *International Journal of Foresight and Innovation Policy*, and *Foresight and STI Governance* journals.

The institutionalization of the discipline also became apparent in the emergence of full-time scholars and communities all over the world (Bell 2003). It is important to note that a substantial magnitude of economic forecasters, strategic planners, social scientists, policy analysts, risk managers, and consultants are also active in this field. However, they do not all define themselves as futurists.

3. Globalization and Practical Breakthroughs of Futures Studies between the 1970s and 1990s

Futures studies in the 1970s became somewhat less focused on Cold War scenarios. Gabor (1972) assessed there to be zero probability of an outbreak of nuclear conflict and

instead called attention to solutions for deep social problems. At that time, the emphasis of futures studies was on accelerating globalization, world futures scenarios, and social transformation. According to Son (2015), futures studies in the 1970s can be characterized by worldwide discourses largely focusing on global futures, the development of normative futures, and the deeper infiltration of futures studies into the business sphere.

Futures thinking also gained popularity in corporate strategy formulation during this period. Dror (1970) believed that futures studies could significantly contribute to corporate strategic management by inspiring the development of new mentalities and providing necessary inputs for decision-making. The United Nations Industrial Development Organization (UNIDO) published a very detailed technology foresight handbook for companies containing futures and strategic planning methods in order to manage the challenges of an uncertain environment (UNIDO 2005). Foresight is demonstrated in the influence of futures studies on innovation systems by various means to a significant extent (Havas and Weber 2017).

Socio-economic transformation to that of an information-driven society changed the focus of mainstream futures studies to the development of a post-industrial economy and society, which was embodied in three widely regarded classic publications (Toffler 1970, 1980; Bell 1976). Positive and negative future images of post-industrial societies were subsequently analyzed in four prominent scenarios (Marien and Jennings 1989). Probably the most transformational approach regarding the impact of information technology (IT) on society and humanity was published by Kurzweil (1999).

Another classic publication appeared in the form of the bestselling text *Limits to growth*, originally published by Meadows et al. (1972) and with subsequent revisions twenty and thirty-two years later (Meadows et al. 1992, 2004). The Club of Rome, founded in 1968, drew attention to the dangers presented by status quo situations via computerized simulations. Priority was thus placed on the limits of the world's capacity for sustainability as a result of excessive population growth, resource consumption, and environmental pollution. The idea behind the formation of the Club of Rome was based on Peccei's concept of the 'problematic', whereby viewing the problems of humanity discretely in terms of isolation was deemed to be doomed to failure (Facioni and Paura 2022).

Novel methodologies to develop future alternatives for security, population trends, environmental catastrophes, and differences between the Northern and Southern Hemispheres became common features of the history of futures studies (Beres and Targ 1975). They incorporated epistemological, ontological, economic, and technological methodologies. Members of the Club of Rome overcame the deficiencies of their first world model in 1974, wherein the world was divided into ten separate regions as opposed to an initial overall global magnitude. The model was thus made more flexible by allowing future alternatives to be explored. Furthermore, it invited the observer to interact by establishing itself as a decision-making instrument (Mesarovic and Pestel 1974). In contrast to previous reports delivered to the Club of Rome, Tinbergen (1976) emphasized development, distribution, and improved welfare levels that entailed a reasonable extent of economic growth. Leontief (1977) studied the environmental aspects of the future world economy, including a set of alternative projections of demographic, economic, and environmental scenarios for the world in subsequent decades. According to Hirsch (1978), growth actually has limits; however, they depend on social rather than physical factors. Botkin et al. (1979) placed particular importance on new forms of learning and education to deal with global issues and for bridging the gap between the complexity and the risks of global issues having inadequately developed capacity to face up to them. The subsequent research on the blue economy suggested that industrial processes could be altered to use simpler and cleaner technologies (Pauli 2010).

One year following the publication of *Limits to growth*, a major oil crisis occurred in 1973, which fundamentally questioned the *raison d'etre* of traditional economic predictions for the future and decisively changed futures thinking (Van der Heijden 1997). Several national governments, United Nations agencies, universities, and research institutions sup-

ported global modeling projects in the 1970s and 1980s with a primary focus on developing future alternatives for population, resources, environmental pollution, poverty, industries, and emerging technologies (Cole 1987).

By that time, futures studies had emerged to embody a global institutional system. Futurists summarized the developmental history of the discipline in various publications by comprehensively outlining their assumptions and standpoints on futures studies (Marien and Jennings 1987; Coates and Jarratt 1989). Naisbitt (1982) in particular emphasized a monitoring role performed by futures studies. With reference to identified, explored, and monitored trends, ten specific megatrends were elaborated upon to shape the future of the US. A similar research exercise was repeated at the beginning of the 1990s, whereupon ten new further megatrends were identified (Naisbitt and Aburdene 1990). By deriving inferences from exponential population growth and inequalities between rich and poor, Laszlo (1985) envisaged a global crisis. However, it was also anticipated that beyond the crisis period, a higher-level, livable, socio-cultural future might emerge.

Futures studies had become a mature discipline by the 1990s. A wide range of comprehensive publications at that time synthesized the preceding results of futures studies and evaluated accomplishments emanating from the originally defined ambitions (Moll 1991; Tough 1991; Masini 1993; Coates et al. 1996; Slaughter 1996b; Kurian and Molitor 1996). It can, therefore, be concluded that, by the 1990s, futurists had come to possess global-level, mutually shared theoretical concepts, objectives, ethics, methods, empirical results, and communities, which were summarized in an outstanding comprehensive publication produced by Bell (2003). However, a noticeable tendency then emerged in the fragmentation of futures studies (Marien 2002).

A wide range of quantitative and qualitative approaches and practical tools in the field of forecasting were published in a comprehensive text by Armstrong (2001). Slaughter (1996a) developed a conceptual framework to advance futures studies into the area of social capacity. Furthermore, Inayatullah (1998) endeavored to link macrohistory with alternative futures.

A decades-long history of the application of scenario planning was perfected in the 1990s, largely influenced by strategic management studies. A detailed methodological handbook on accomplishing futures thinking and scenario planning in corporate strategy formulation was published by Schwartz (1996), which was extended to a conceptual conjuncture with strategic thinking by Van der Van der Heijden (1997). A decade later, Bishop et al. (2007) comprehensively evaluated twenty-two scenario methods in eight categories with outstanding success.

The foundations of flexible, creative, and strategic futures thinking were summarized by Hamel and Pralahad (1996) in order to sustain competitiveness and achieve global success. A comprehensive review of applying 'wild cards' with a potentially significant impact on global futures was provided through several practical examples by Petersen (1997). Experiences with futures workshop techniques acting as popular participatory futures methods were evaluated by Jungk and Müllert (1989). The most important strategic management factors shaping world futures were discussed in depth by Hughes and Hillebrand (2006). To facilitate practical use, a database of considered trends and interrelationships was made publicly available. Kim and Dator (1999) argued that, before the emergence of decision-making, governments should consciously strive to balance the demands of the present with the needs of future generations.

In the 1990s, futures studies also developed within the framework of neoliberal futures (Son 2015). The further deepening of globalization and spectacular IT developments, together with the risks of environmental degradation and uncertainties in global societies, moved futures studies toward increasingly neoliberal futures. In this era, Slaughter (2002b) argued that futures studies should place greater focus on strategic foresight, as several futures methods have limited and superfluous uses. The passage of time has demonstrated that this view has manifested in the 2010s and in the current period. Foresight practitioners

enriched futures studies with a strategic planning dimension that was largely absent from traditional futures studies.

Foresight can be accomplished in various forms. National foresight programs, for example, represent means of coordinating science, technology, and innovation policies and responding to conditions of uncertainty and change at the country level (Portaleoni et al. 2013). Regional foresight is considered a prime regional-planning approach to increase the ability to deal with uncertainty and change (Amini et al. 2021). Corporate foresight entails the application of foresight practices by an organization to advance itself, fulfill its purpose, and achieve success on terms it has already defined (Marinković et al. 2022). Sectoral foresight is designed to inspire a dialog between sectoral actors and across interrelated sectoral innovation systems (Gaponenko 2022). Environmental foresight is intended to provide a systematic way of examining the possible future outcomes of emerging environmental issues with the aim of underpinning present decision-making methods (Bengston et al. 2012). Technology foresight is widely regarded as a systematic exercise aimed at examining the longer-term future of science, technology, and innovation in order to make better-informed policy decisions (Miles et al. 2017). Finally, open foresight represents a model of collaborative web-based foresight initiatives (Miemis et al. 2012).

The Millennium Project launched its activities in 1996 with the aim of improving the human potential for building a better future (Gordon and Glenn 1999). Since 1997, it has regularly updated the *State of the Future* publication, comprehensively dealing with global futures, many of which were selected as the best futures product of the given year (Glenn and Florescu 2017). The Millennium Project has accordingly published the most detailed and peer-reviewed collection of futures methods and tools (Glenn and Gordon 2009).

In line with advancements from a global-level meta-disciplinary perspective, more and more universities have incorporated futures studies into their education portfolio at the master's degree (MA) and doctoral levels. The first university course in the field of futures studies, entitled 'Social change and future', was delivered by Toffler in 1966 at the New School for Social Research (Bell 2003), and the first doctoral program commenced in 1969 at the University of Massachusetts (Oliver 1998). The first MA program in futures studies began in 1975 at the University of Houston—Clear Lake. This was renamed 'foresight' in 2007 due to the previously discussed intervening developments in the discipline (Bishop and Hines 2012). The first MA futures program in Europe was launched in 2010 at the Free University of Berlin (Germany), which was followed by the University of Turku (Finland) in 2012.

Educational experiences and challenges were comprehensively evaluated by Dator (2002). It can be concluded from this study that the theoretical, methodological, and practical knowledge basis of the discipline also appeared in internationally well-documented curricula, thereby enriching the corpus of academic literature on futures studies.

4. Futures Studies and Foresight in the 21st Century

Following the turn of the millennium, Slaughter (2002a) proposed that the next major strategic issue for futures studies would be in underpinning the foundation of a new civilization. By making use of practical experience, Hines (2002) argued for proceeding beyond the cyclical nature of future inquiry and the better integration of futures studies into organizational contexts, largely because futures studies had already demonstrated its competency for practice. According to Masini (2002), new visions should be developed for the performance and educational delivery of futures studies in order to enhance the future orientation of future generations. Inayatullah (2002) argued that futures studies should move toward anticipatory action learning, complex and vertical approaches, long-term narratives, and moral futures, while Cornish (2004) explored global futures based on identified 'supertrends'.

Hines and Bishop (2006) published a handbook outlining the experiences of several practitioners for the express purpose of effectively completing strategic foresight projects. Hopes and fears in contemporary futures thinking, together with the persons contributing

the most to futures studies, were summarized by Lombardo (2006). Typical methodological errors encountered in futures thinking were analyzed in depth by Weiner and Brown (2006). The 'black swan' approach convincingly revealed why, in general, practitioners and theoreticians do not know enough about the future in which they believe (Taleb 2007).

By the 2010s, complexity science had become widely regarded as an essential element of futures studies in order to support the treatment of complex social problems in the 21st century (Derbyshire 2016). In order to manage challenges derived from the concept of complexity science and to enact complexity-oriented futures studies, horizon scanning and weak signals approaches became widespread. Hideg (2015) provided a historical evaluation of the international mainstream futures field through its evolution from forecasting across evolutionary and critical futures studies to the application of foresight to integral futures.

Futures studies at the beginning of the 2010s was also heavily influenced by the impact of the global financial-economic crisis in 2007–2009. Slaughter (2010) argued for the protection of the future and envisaged a long-lasting global crisis unless historically significant steps were taken. Relatedly, as a result of the subsequent COVID-19 pandemic, a great number of studies have been published on the topic of post-COVID societies (McAuley and Nesbitt-Larking 2022).

The 2010s were mostly dominated by the implementation of multiple and diverse practical foresight projects. Consequently, futures studies became business-oriented, and aspects such as the future of humanity, social interests, mutual values, and future generations have acquired a lesser focus (Son 2015). The practical usability of foresight has also increasingly formulated futures studies into a strategic management tool. Feasible futures are often evaluated with a focus on economic profit and management goals. Dator (2009) provided a systematic approach to exploring community-oriented futures whereby communities or organizations might plan to move toward preferred futures. Moreover, since around 2000, several futurists have focused on relatively narrow, easily manageable fields, which corroborates a picture of the fragmentation of the discipline (Kuosa 2011).

Publication activity in futures studies between 1968 and 2017 was evaluated through a bibliometric literature review by Fergnani (2019). A meta-analysis of articles in the ten selected highest-ranking journals enabled the identification of research trends (clusters). These consisted of corporate foresight, past and futures, humanity at the limen threshold, the environmental future, post-normality and complexity, and technological trends. Relevant research topics within clusters were then visualized in order to locate research gaps. Based on the results, future research directions were recommended for the discipline (Fergnani ibid.). Since corporate foresight possesses favorable citation statistics, it was proposed that corporate foresight be integrated with other research fields using more intensive uses of corporate foresight methods. Applying scenarios, technology roadmapping, and Delphi methods was proposed outside organizational settings. Trying under-utilized methods was recommended in the field of environmental futures to bring traditional futures themes back into fashion. The author also cautioned against shying away from complexity; however, this would entail designing the futures of the most sophisticated recent technologies (Fergnani ibid.).

At the conclusion of this historical development review, legitimate questions are raised as to the directions future studies should follow in the forthcoming period. As futures studies was founded and accomplished in a multi-threaded manner, many authors are convinced that the discipline will develop in the future in terms of multiple strands of enquiry. The products of futures studies are expected to be published in a higher volume than at present in a highly diverse range of publication outlets, some of which do not currently exist.

One of the most recognized theoretical and methodological outcomes of futures studies is the establishment of the integral futures paradigm (Hideg 2013). It is an approach that adapted Wilber's integral theory to futures practice. A key concept underlying integral theory is to include as many perspectives, styles, and methodologies as possible when exploring a topic (Collins and Hines 2010). According to Jakonen (2021), integral futures

should become an essential part of foresight research and practical applications. For this to be achieved, utilizing the seven essential capacities is advised, as discussed in depth by Slaughter (2008).

Since climate change might result in the collapse of human civilization, research on social collapses has become a relevant focus in futures studies (Brozović 2023). This trend is expected to gain even higher levels of interest in the future.

Within the framework of transition studies to sustainability, Vähäkaria et al. (2020) recommended combining a multi-level perspective on socio-technical transitions with futures studies. Such a combined approach is currently under-represented, yet climatic change and transitions to sustainability are currently very popular and influential research fields not only in futures studies but also in the wider domain of social sciences. Thus, a higher priority is expected to be placed on such research activities in the future.

However, according to Øverland (2023), futurists should avoid the hegemony of climate and environmental policies as current highly emphasized research trends. As such, futures studies would need a new conceptual framework, including negation and post-prefixes, to shape research fields over the next fifty years.

Recent research in the field of energy futures has already identified a diverse range of challenges and contradictions. As per Krüger et al. (2022), energy transition can be regarded as a civilizational transformation that can be a source of various social conflicts. Consequently, energy futures are anticipated to be a popular research field in the forthcoming period.

In recent years, the knowledge base of futures studies has gradually been integrated into the enterprise development and strategy formulation practices of small- and medium-sized enterprises to formalize the future-shaping activities of entrepreneurs (Thompson and Byrne 2022). In order to underpin entrepreneurial innovation, this activity is expected to intensify in the future, as entrepreneurial foresight can foster better explorations of business opportunities (Hajizadeh and Valliere 2022).

Life in the 21st century is increasingly influenced by artificial intelligence (AI), machine learning (ML), big data, and robotics (Geraci 2022). The future of AI technology and the construction of related futures thus have a fundamental impact on the world. According to Dator (2020), AI has an unequivocal position in futures studies, as it can develop the discipline and deepen its knowledge base into directions for which no historical precedent presently exists. However, it is essential to identify that, even if current AI techniques are successful in making short-term forecasts, they can often lead to misleading results in relation to the longer-term horizon. Futurists and AI researchers are thus very likely to face substantial issues that need to be resolved in the future together while mitigating ethical concerns (Díaz-Domínguez 2020).

Furthermore, Saritas et al. (2022) believe that the scope of foresight will further extend in the future. A new generation of foresight in the 2030s could be derived from systemic foresight, applied foresight, and foresight onsite.

5. Conclusions

On the basis of the preceding narrative, it can be concluded that, as a result of almost a century-long development history, scientific-based futures studies have come into existence in multiple strands and development paths. Aspects of philosophy of science, sociology, policy sciences, technological forecasting, economic prognostics, military and national security strategy formulation, national planning systems, system analysis, and environmental sustainability have all demonstrated an unequivocally documented contribution to the creation of the discipline.

In the era between World War II and the 1960s, priority was given to the rationalization of futures thinking by grounding the science of forecasting and the knowledge base of futures studies. Futures studies became a generally accepted academic discipline by the 1960s when it became clearly visible in the overall international scientific community. The largest world federations and the most prestigious scientific journals were founded

in that decade, and doctoral- and master-level educational programs in futures studies were launched.

In the 1970s, emphasis was placed on future discourses on global problems, whereby numerous normative (preferred) futures were constructed. Futures studies thus became an integrated element of strategy-formulation practices. Consequently, by the 1980s, futures studies had come to embody a global institutional system. Futurists summarized the history of the development of the discipline in various publications to outline their assumptions and standpoints. Hence, by the 1990s, futures studies had become a mature discipline. By that time, futurists had come to possess global-level, mutually shared theoretical concepts; objectives; ethics; methods; empirical results; and collectively shared ideas in communities. However, the fragmentation of the discipline was already apparent. A wide range of comprehensive publications synthesized the preceding results of futures studies.

By the 2000s, the theoretical, methodological, and practical knowledge base of the discipline had also appeared in internationally well-documented curricula. In accompaniment, around the turn of the millennium, active discourses took place about the future role of futures studies. The 2010s and 2020s, to this point, can be characterized by practical foresight projects; thus, futures studies has become somewhat more business-oriented.

Based on research trends and up-to-date expectations, futures studies is likely to develop in multiple strands within the framework of the integral futures paradigm. Future research directions are accordingly expected to entail socio-technological transitions, post-climate-change goals, social collapses, the future of energy, the application of corporate foresight tools to different fields, the underpinning of entrepreneurial innovation, the future of AI, systemic foresight, applied foresight, and foresight onsite.

It can be found from the development history of the discipline that the demand for futures studies is notably higher in the periods when risks, uncertainties, and crises amplify and when interrelationships shaping the future of individuals, communities, societies, economies, regions, and the world are volatile and complex. As this is currently the case, the strengthening and broadening of the discipline can be expected in the near future.

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