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Mission-Oriented Innovation Policy for Sustainable Development: A Systematic Literature Review

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Abstract: This paper aims to explore effective ways to incorporate a mission-orientated framework to innovation policies that are designed to achieve the United Nations' Sustainable Development Goals (SDGs). This paper aims to identify the strategies of MOIP to inform innovation and sustainability in the Middle East and North Africa (MENA) region, particularly focusing on the Gulf Corporation Council (GCC) context. It does so through a systematic literature review of current studies related to MOIP, according to the PRISMA protocol, regarding countries in the GCC region that are currently undergoing ambitious national strategic development plans with sustainability and inclusive growth at their core. This particularly targets SDG 9, which is about fostering innovation that is inclusive and sustainable. Implications for this study may inform innovation policy in the GCC and even inspire the wider Middle East and North Africa (MENA) region in terms of innovation metrics, energy transitions, the innovation ecosystem, public participation, and policy implementation and evaluation. Based on the systematic review and current innovation ecosystems and practices in the GCC, recommendations and strategic options are outlined.

Keywords: mission economy; innovation policy; sustainable development; GCC; inclusive innovation; circular economy

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1. Introduction

Globally, humanity is faced with grand challenges as reflected in sustainable development goals (SDGs) ranging from food and energy security to poverty and climate change risks. These challenges require a paradigm shift and new framing of problems by co-defining clear objectives and articulating a portfolio of projects based on multistakeholder dialogue to address market failures and create public value [1]. It is argued that developing nations have the capacity to catch up and leapfrog innovative nations if they embody a transformative and integral innovation culture and mindset [2]. However, reconciling social development, economic growth, and sustainability is viewed as a "wicked" problem since market-driven policies have resulted in widening the gap between rich and poor nations [3].

Manifestations of market and policy failures include consumerism culture, pollution, and climate risks to name just a few [4]. As a result, nations have articulated mission-oriented innovation policies (MOIPs), which direct and steer innovation towards alleviating complex grand societal challenges that consider holistic issues, such as inequality and environmental conservation, as opposed to simply focusing on economic growth [5]. MOIP is characterized as a network innovation model where investment in research and development (R&D) will result in technological innovations [6] through alignment of national dynamic capabilities [5]. An example of an MOIP is entrepreneurial states funding mega projects in science and technology, which proved to yield breakthrough innovations in

clean energy [7]. Furthermore, articulating a national development agenda is key to framing mission-oriented policies, for example, in the case of the US project to land a man on the moon [8].

Aim and Importance of This Research

MOIP is now being widely attempted and practiced primarily in the US and EU with many regional innovation schemes (RIS) and innovation ecosystems, such as the European Innovation Ecosystem (EIE) as well as an EU–China joint innovation center (EUCJIC) being established [9,10]. Many researchers in the field are documenting their progress and assessing the outcomes, particularly focusing on the key enablers, drivers providing recommendations for future projects, and collaborations.

Through a systematic literature review, the aim of this paper is to identify the key drivers, enablers, and governance models of MOIP to inform innovation and sustainability in the GCC context. The GCC countries have all adopted ambitious national visions for 2030 and are rigorously attempting to achieve non-hydrocarbon-based sustainable economies. Many projects and vast sums of investment are being poured into the region. Yet, hitherto, studies have not explored these practices through the framework and latest developments of MOIP, particularly in terms of learning from other country case studies. As will be discussed below, our systematic review of the literature on MOIP found 72 peer-reviewed articles on the Web of Science database discussing cases of MOIP. Not even one article covered the MENA or GCC region; the vast majority were based on the EU region or were theoretical. The GCC could greatly benefit by learning from other country case studies and best practices specifically related to enablers, drivers, governance models, and policy planning and adapting them to their context.

In the past, there have been many failed attempts at regional innovation. One example is the case of Egypt's national car project in the 1950s. The Nasr Automotive Manufacturing Company was established as part of a broader movement toward industrialization and economic independence across the Arab and African regions [11]. However, despite this ambition, the company struggled to maintain competitiveness and eventually ceased production. The failure of Nasr can be attributed primarily to three factors: limited technological capability, market liberalization, and a lack of investment [12]. Another example is Sudan and the Al-Jazirah mega agricultural project. This was another ambitious initiative aimed at achieving food security. Despite an inspiring vision and abundant water resources, the project fell short of its goals, grappling with issues of economic viability, governance, and management [13]. The project's failure was primarily due to inadequate infrastructure, an unsustainable business and financial model, and poor governance. This case underscores the importance of meticulous planning, sound infrastructure, sustainable financial models, and effective governance in the realization of MOIP.

The fledgling GCC states, albeit at different levels, have hitherto achieved great economic success and rapid modernization and development due to revenues from their natural resources. Yet, in order to transform into sustainable and globally competitive economies, exploring best practices from successful MOIP implementations elsewhere while avoiding certain pitfalls can significantly enhance the GCC's prospects of success. As will be discussed below, the GCC region is rapidly enhancing its innovative capacity, with the UAE leading the way. Therefore, this research aims to explore some of the best drivers, enablers, governance models, and policy practices that could be put in place according to the recent MOIP case studies. This paper fits under the new section, Development Goals towards Sustainability [14], as MOIP is about inclusivity and inviting multiple and diverse public stakeholders early in the process to unite behind the shared goal of exploring different options and potentially cocreating innovative and more effective solutions [15].

This paper is structured as follows: Section 2 outlines the systematic literature review (SLR) methodology; Section 3 presents the key analysis of MOIP models, drivers, enablers, outcomes, governance models, and policy cycles. Section 4 outlines the key findings of

MOIP. Section 5 discusses these findings within the context of innovation in the GCC with policy implications and recommendations.

2. Materials and Methods

The systematic literature review is based on the framework developed by Gough et al. (2012) [16] and Jesson et al. (2011) [17]. The review aims to identify the relevant governance models, enablers, and drivers for MOIP research. Through a systematic literature review, this research intends to set a holistic strategy that maps the global research agenda on mission-oriented policies to identify trends that can be harnessed in galvanizing the long-term policy landscape. Conducting a systematic literature review includes three phases: review protocol, evaluation, and synthesis, as depicted in the following Figure 1:

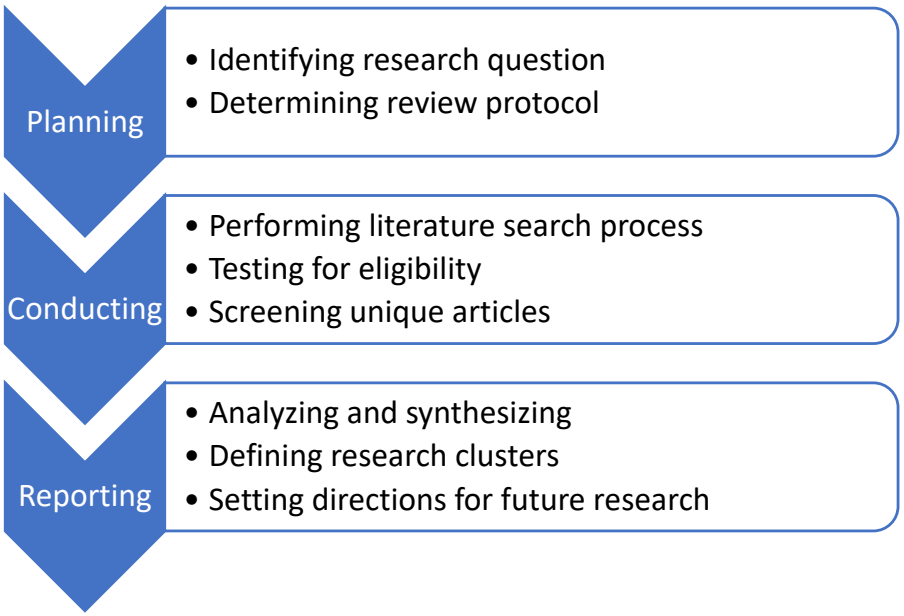


Figure 1. The process for the systematic literature review.

The search strategy and review protocol were guided by the research question. The systematic literature review followed the guidelines of the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) [18] as depicted in Figure 2 below (Supplementary Table S1). This research was based on papers published on Web of Science in English during the period 2013–2023. Other databases were consulted including ProQuest, Google Scholar, and Science Direct for wider coverage and triangulation. The keywords used were mission economy, innovation policy, sustainable development, GCC, inclusive innovation, and circular economy. The rationale behind the time selection is linked to the proliferation of the concept of mission-oriented policies as a strategy to address grand challenges that face humanity in the 21st century. The review excludes conference proceeding papers, master's theses, doctoral dissertations, textbooks, and unpublished working papers. Web of Science (WoS) (accessible at www.WoS.com (accessed on 3 March 2023)) provided the electronic database for this review. WoS is one of the world's largest online databases of peer-reviewed scientific publications, is adequate for SLR [19], and is regarded as a comprehensive and quality database [20]. Furthermore, it also has a wide network of peer-reviewed literature [21].



Figure 2. Flow diagram for systematic literature review following PRISMA guidelines.

At the evaluation phase, sources are identified and filtered using keywords to generate papers based on journal titles, abstracts, and keywords. The search process utilized the key terms to scan the generated papers by publication title. Logical relationships between the papers were identified and refined using the operator AND to link titles, abstracts, and keywords of relevant results. The search started with the keywords "Mission Oriented" and "Innovation Policy". The specific search string used was (TS = (Mission) AND TS = (Oriented) AND TS = (Innovation) AND TS = (Policy)). Keyword searches through journal titles, abstracts, keywords, and topics yielded 137 articles. Figure 3 shows the compiled body of literature from 2013 to 2023. The inclusion criteria may have led to exclusion of articles that did not use the specified keywords in the search, which would constitute a limitation of the research.

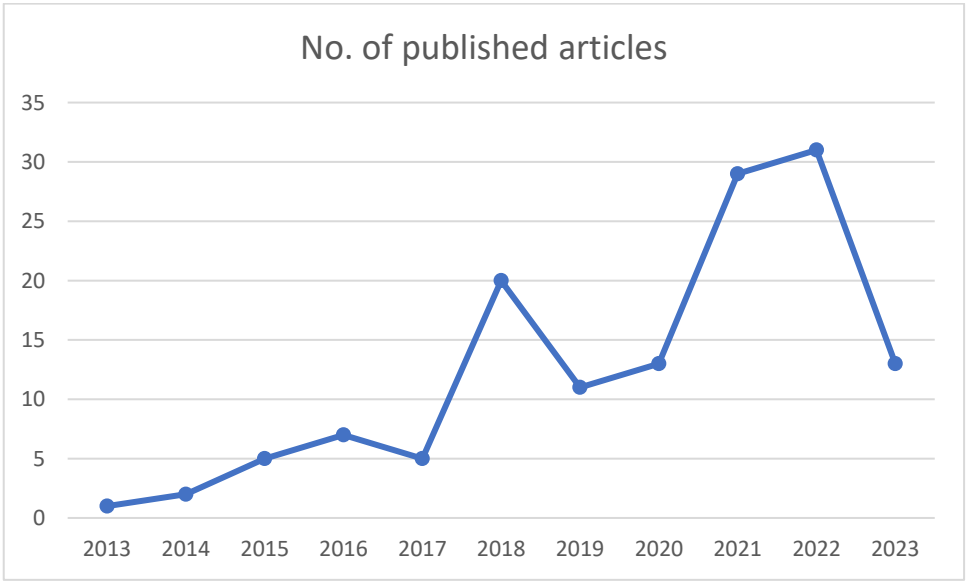


Figure 3. Yearly distribution of peer-reviewed published papers used in this review.

In line with this review's scope, the research applies cross-referencing and screening to eliminate duplicates and exclude irrelevant sources. As part of the review process, key concepts, themes, and findings were analyzed to ensure alignment with the research

question. Based on similarities and differences in terms of sectors, objectives, regions, drivers, enablers, and methods, themes and clusters emerged.

After completing the evaluation phase, the synthesis phase started, combining the findings to answer the research question. Each article was read by at least one author and coded according to seven categories—focus area, sector, methodologies, drivers, enablers, and governance models. Codes were initially discussed and defined. The sector and area of focus were primarily taken from the abstract and the method from the Section 2. The drivers were identified by seeing what the authors of the selected articles cited as the impetus behind the push for MOIP in that case; this was usually in the introduction. Key enablers were identified by seeing what the authors of the articles saw as the primary catalysts for change. If articles discussed the role of governance, then the particular model discussed was deduced. The latter two were usually found in the Sections 5 and 6 of the articles. During the coding phase, the entire team had regular meetings to ensure accuracy and coherency.

During this phase, irrelevant articles were excluded and only 72 eligible articles were used for the final review.

Reviewed data were published in a diverse set of journals including *Science and Public Policy*, *Research Policy*, *Industrial and Corporate Change*, and *Sustainability*. The Table 1 below depicts the frequency of the articles in published journals.

Table 1. Frequency of articles published in journals.

Journal's Name	Frequency
Science and Public Policy	14
Sustainability	10
Industrial and Corporate Change	9
Technological Forecasting and Social Change	5
Environmental Innovation and Societal Transitions	4
Research Policy	4
European Planning Studies	4
Molecular Oncology	3
Innovation—the European Journal of Social Science Research	3
Journal of Cleaner Production	3
Energies	2
Economics of Innovation and New Technology	2
Journal of Intellectual Capital	2
Global Food Security—Agriculture Policy Economics and Environment	2
Journal of Responsible Innovation	2
Hacienda Publica Espanola—Review of Public Economics	2
Oxford Review of Economic Policy	2
Agricultural Systems	2
Agronomy for Sustainable Development	2
Small Business Economics	2
Asian Journal of Technology Innovation	2
Industry and Innovation	2
Technovation	2
Industry and Higher Education	2
International Journal of Health Planning and Management	2
Other 48 journals	1

Most papers were published in the journal *Science and Public Policy*, as indicated by the previous table.

3. Results

3.1. Methods, Focus Areas, and Sectors

Table 2 summarizes the methods the selected papers for MOIP used. Many papers used conceptual methods, case studies, patent data, policy analysis, and empirical testing. In

terms of focus, many articles focus on sustainability transition, development and diffusion of innovative solutions, education for sustainable development, and clean growth. Table 3 presents the different focus areas of reviewed papers. Table 4 shows that sectors covered by the reviewed articles include macroeconomics, environment and energy, technology, education and R&D, food and agriculture, and healthcare.

Table 2. Mission-oriented policy assessment methods in this review.

Method	Number of Instances in the Literature
Conceptual	26
Content analysis—case study	15
Patent data—bibliographic analysis	6
Policy analysis	6
Empirical	5
Qualitative	3
Action research	3
Forecasting and foresight	3
Deductive	1
Computer simulation	1
Quantitative	1
Modelling	1
Mixed approach	1

Table 3. Focus areas of articles in this review.

Focus Area	Number of Instances in the Literature
Sustainability transition and SDGs	19
Diffusion of innovative solutions	10
Responsible research and innovation	8
Industry 4.0 and emerging technologies	6
Education for sustainable development	6
Research and innovation policy	5
Monitoring and evaluation	5
Financing healthcare and military research	3
Financing R&D and innovation	2
Participatory foresight	2
Impact of scalability on innovation	2
Public–private partnerships in innovation	2
Regional innovation systems	2

Table 4. Mission-oriented sectors in this review.

Sector	Number of Instances in the Literature
Macroeconomics	19
Environment and energy	18
Technology sector	8
Education and R&D	8
Food and agriculture	6
Healthcare	6
Innovation	3
Urban planning	2
Urban transport	1
Education	1

3.2. Drivers for MOIP

Each paper was analyzed and the primary drivers for MOIP as outlined in the paper were extracted. Some papers discussed multiple drivers, hence the total number of studies in the table being greater than the total number of papers. Table 5 summarizes the key drivers.

Table 5. Drivers for MOIP.

Number	Driver Codes	Description	Number of Studies	Literature
1	Grand societal challenges	Grand societal challenges are highly complex social and environmental issues that transcend national borders and require a multidimensional approach.	23	[22–43]
2	Climate–environment nexus	This includes mitigating climate change and prevention of environmental loss.	16	[24,42,44–54]
3	Technological development and entrepreneurship	This includes the need for innovative development, research, and entrepreneurship in different sectors.	13	[55–63]
4	Economic growth and circular economy	This is boosting the economy through the production of goods or services including, at times, with sustainable objectives.	8	[26,45,64–69]
5	Global public health	This includes public health issues including malnutrition, reducing widespread chronic diseases, and human wellbeing in general.	6	[48,70–74]
6	Agenda for SDGs	This is the global push for the transition to sustainability.	6	[34,75–79]
7	Crisis-driven and market failure	This includes crises such as the global COVID-19 pandemic and economic slowdown.	6	[37,79–83]
8	Global competition	This includes the drive to lead with a competitive edge, regional visions, and mandates as well as future-orientated strategic intelligence.	5	[61,84–87]
9	Food–environment nexus	This includes sustainable food production, particularly in agriculture.	5	[44,88–91]
10	Spatial development	This includes the need for development in both urban and rural spaces.	2	[25,92]
	Total		**90**	

From the selected studies, ten overall drivers were recognized as being the primary push to implement MOIP. The following section describes each category and subcategory, providing examples from the studies. The first major theme that emerged (theme 1, $n = 23$) was grand societal challenges (GSCs). GCSs are "massive social and environmental issues that transcend national borders—such as climate change, inequality, disruptive migration, and global pandemics—and that have potential or actual negative effects on large numbers of people, communities, and the planet as a whole" [93]. There are three facets to GSCs: first is complexity, characterized by many interactions on different levels and nonlinear dynamics; second is uncertainty with issues and their evolution being difficult to forecast and identify future scenarios; third is multiplicity, where the challenges and possible solutions could be approached and understood in various ways with no conclusive method to determine one better than the other [94]. Indeed, it is this shift from aiming solely for economic growth to solving "wicked" [95] societal challenges that led to renewed interest in mission-orientated innovation and responsible innovation prevalent in the 1960s and 1970s [27]. These societal challenge-led missions are complex and unstructured problems that require fundamental institutional, societal, technological, and behavioral changes [96,97]. Most articles in this category included those that explored this theory conceptually or in light of a case study or region, teasing out different issues and at times providing alternative pathways or suggestions. For example, one study explored the complex dynamics of multiple stakeholders at multiple levels co-constructing an ur-

ban Swedish innovation program and found that there was no consensus or conflict, the common thread discussed in the MOIP literature, but rather quiet delegation from each stakeholder that lead to a lack of ambition and transformative change [25].

The second major category of drivers (n = 16) was the climate–environment nexus. In other words, the main impetus was mitigating climate change and preservation of the environment. In this category, some studies were practical, such as recycling solutions for plastic packaging (e.g., [50]); others focused on policymakers, planners, and strategists and how they can successfully take into account multiple perspectives (e.g., [47,49]); and some analyzed the issue conceptually, advancing new paradigms, for example, the intersection of industrial and environmental goals in national strategies (e.g., [45]).

The third category of drivers (n= 13) was the desire for creative and technological development, particularly in the domains of innovation, entrepreneurship, and research. In these cases, the main motivation was the overall development for market opportunities and growth and supporting innovative enterprises. These studies included those that examined what governance models, policies, ideas, and programs are needed to foster creative and technological development (e.g., [55,58,61]); others looked at how education, especially higher education, can support this development, such as digital literacy and "spillovers" (e.g., [56,57,98]).

The fourth category of drivers (n = 8) was economic growth and circular economy. These included studies that analyzed, at times through case studies, the impact and need for governments to make strategic investments and different types of policies, such as fiscal policies, and market-creating policies to increase macroeconomic stability (e.g., [26,64,65]). Other studies discussed how increased economic opportunities can be the key drivers for transformative mission-oriented change (e.g., [70]). Also included in this category were papers that explored barriers and conditions for transitioning to a circular economy and economic diversification (e.g., [67–69]).

The fifth category of drivers (n = 6) was global public health. This included a variety of studies, such as those exploring specific health issues such as malnutrition, allergies, cancer, and the effects of pesticides (e.g., [48,70,72,73]). One study examined health-orientated public and private organizations (e.g., [71]) and one explored health intervention strategies for the military, highlighting the difference between it and civilian populations (e.g., [74]).

The sixth category of drivers was sustainable development in general and the global push for sustainable transitions in all industries. These included studies on the role of education (e.g., [77]), policies (e.g., [78]), other critical factors (e.g., [34]), and challenges (e.g., [79]) in the shift towards achieving the United Nations' Sustainable Development Goals (SDGs).

The seventh category of drivers for MOIP (n = 6) was crisis driven or market failure. This included the need for innovation or fresh thinking that was abruptly revealed due to market failures, economic slowdown, and the COVID-19 pandemic (e.g., [81,82]). Some studies also explored the framework of market fixing juxtaposed against market shaping and market creation in the context of transformative innovation (e.g., [80,83]).

The eighth category (n = 5) of drivers was global competition, leadership, and vision. This is where innovation is spurred through the push to be the global leaders, especially in technology for market opportunities and to be at the forefront of global challenges (e.g., [61,85]). Also, some studies examined strategic intelligence and foresight in policy making to generate future regional visions (e.g., [84,86,87]).

The ninth category (n = 5) of drivers was the food and environment nexus. Most of the papers focused on case studies for agricultural innovations (e.g., [89,90]), with one study looking at food security in light of climate change (e.g., [44]). The final category (n = 2) of drivers was urban and rural development, which comprised case studies in Sweden and South Africa exploring the dynamics of innovative policies towards this end (e.g., [25,92]).

3.3. Enablers

Table 6 outlines the MOIP enablers based on the selected papers. This is followed by a discussion for each enabler category.

Table 6. MOIP enablers.

Number	Enabler	Description	Number of Studies	Literature
1	Innovation policies	Transformative policies that enable and encourage innovation towards solving or alleviating societal problems.	30	[23–27,29,33,34,36,40,42–44,46,49,50,54–56,58,63,65,78,83–87,99]
2	Research	This includes science combined with human-centered or value-based considerations, implementation science, and research in general to gain a deeper understanding of societal issues.	17	[23,37,44,47,48,51,58,60,70,72,73,84,90,91,99,100]
3	Innovation Ecosystem	This includes a system that fosters and supports creativity and innovation. It also includes the important role of universities and other organizations and partnerships such as relevant international organizations and public–private partnerships.	17	[28,30,32,35,38,52,53,57,61,71,74,75,77,88,98,101]
4	Smart growth	This includes plans for smart growth, inclusive growth, circular business models, and clean growth, as well as strategic investments.	13	[26,31,41,45,54,62,64,65,69,76,80,83,102]
5	Stakeholder collaboration	Innovation requires empowering and involving different segments of society from the producer to the consumer.	8	[44,59,66,73,82,86,89,92]
6	Governance	Government and political leadership agendas and visions.	5	[45,68,76,79,82]
	Total		90 *	

* Some studies mentioned multiple key enablers; hence, the total is more than the number of selected papers.

In total, six enablers for mission-orientated projects were identified in the literature. The following section describes each category and subcategory, providing examples from the studies. The first and most cited in the papers was effective innovation policies (n = 30). The primary difference between classical innovation policies and new transformative or mission-orientated policies is that the ultimate goal is towards solving, or at least alleviating, grand societal challenges, rather than economic growth—a helpful byproduct [103]. Thus, policymakers are tasked with promoting innovation that is directed towards tackling societal problems. This calls for a certain type of government intervention. Similar to market or system failures, which legitimize government fiscal intervention, [104] some have coined the term "transformation failures", which is when the government intervenes in order to influence or change the direction of innovation towards complex societal issues. To this end, a major area in the literature for enabling transformational projects was effective innovation policies, with many offering insights, recommendations, and conceptual frameworks. Analyzing the papers, this category of effective innovation policies can be further divided into five subcategories: rapid diffusion; empowerment of smaller actors; coordination of stakeholders with directionality; specific policies that discouraged certain unsustainable practices or substances; and feedback loops and foresight, each of which is discussed below.

The first feature of effective policies is aiding the rapid diffusion of new technologies. The classical innovation model is where new technologies undergo an extensive formative phase of design and testing and then a slow rollout phase whilst fighting against, and

negotiating with, existing practices, institutions, and social norms. A key example would be new green technologies against powerful and embedded fossil fuel industries. Yet, in the face of grand societal challenges that are looming on the horizon and ambitious global pledges, there is an increased sense of urgency. Many studies highlighted how working within existing structures allowed for less resistance and a faster process for innovation. For example, researchers that analyzed a case study in the Netherlands on offshore wind energy found that rapid diffusion was ensured by policies that "capitalized on the assets, skills, knowledge and resources of incumbent industries and actors" ([46], p. 10).

The second key feature that was discussed in the literature was the need for involving and financing smaller startups and non-industry actors or actors who were not dominant in the field. This would ensure a wider variety and more experimentation, which would increase the chances of radical or disruptive innovations. Despite the advantages of dealing with incumbent actors, namely rapid diffusion, less resistance, and economic growth, alternative pathways and players widen the pool of possible innovations and solutions (e.g., [46]). To avoid the inevitable clash with large industry actors, one study argued for the "small wins" approach, where governments would support a wide range of local grassroots initiatives, that through accumulation would make a profound difference [42].

The third feature of effective innovative policies would be to galvanize important and relevant stakeholders and encourage cocreation and collaboration towards a specific purpose or direction. One example is Cantner and Vannuccini, who coined and advocated for "Schumpeterian catalytic" research and innovation policy. This is a theoretically dense model; however, put briefly, the "Schumpeterian" aspect emphasizes the role and importance of private economic actors and that "catalytic" governance is the "temporary nature of state intervention" ([55], p. 834) where the state only sparks and steers the process of innovation by empowering a wide range of stakeholders in dialogue and discussion. As discussed above, a crucial element of grand societal challenges is the complexity of the problem that requires multiple groups at multiple levels to cocreate potential ways forward. Therefore, policies must encourage and facilitate a high degree of coordination amongst different actors such as between industries, knowledge institutes, and civil society organizations. Research that included case studies also explored the challenges of having multiple actors with different or even conflicting interpretations and goals without clear hierarchal leadership (e.g., [25]).

The fourth feature that some studies discussed was having very specific policies that discouraged certain products or processes in order to spur innovation. For example, policies could be implemented that restrict the usage of components that hinder the recycling process [50]. However, as some pointed out, destabilization policies must be balanced with incentives with other alternative feasible options available [46]. Otherwise, this could lead to "dirty" production simply set up overseas in countries with less restrictions. The fifth and last feature of effective innovation policies was feedback loops through careful monitoring and evaluation (e.g., [36,43]) as well as policies informed through foresight analysis (e.g., [87]).

The second key enabler for mission-orientated innovative projects is research (n = 17). Some studies argued that more research in general would help to gain better knowledge and understanding of the complex issues at hand in order to design or work towards more effective and apt solutions (e.g., study [51,72]). Other studies focused on the need for integrating a human-centered or values-based approach in scientific research (e.g., study [47]). Some have labelled this approach, which includes consideration of societal impact, as responsible research and innovation (RRI) (e.g., [23]). Another type of research framework is implementation science, which is the study of how to encourage the uptake of proven evidence-based practices by the general public, healthcare professionals, and policy makers (e.g., [70,99]). Some papers also specifically discussed the urgent requirement for mission-orientated research in the field of agriculture and its potential in food systems transformations (e.g., study [48,91]).

The third key enabler for mission-orientated innovative projects is curating an innovation ecosystem (n = 17). Universities were cited as one the foundational institutions as part of this ecosystem that need to help society understand and respond to societal issues with critical thinking, complex problem solving and future scenarios, sustainability and entrepreneurial education, and building human capital (e.g., [75,77,98]). Studies also discussed the important role of other organizations and structures such as nongovernmental organizations, relevant international organizations, and public–private partnerships (e.g., [71]). Part of this innovation ecosystem is also social impact accelerator programs (e.g., [28]) or through the effects of transdisciplinary education and "creative spillovers" (e.g., [57]) or through access to new technologies (e.g., [32,53]). In relation to the latter, one study argues that Europe first needs "technological sovereignty" in order to create ground-breaking innovations that would meet their ambitious agendas [53]. Technological sovereignty, that is, "the appropriate level of technological capability to be held in order to avoid structural dependence with third parties" ([53], p. 3), is a precondition to innovation sovereignty—the ability to locally exploit technologies for a specific purpose. In another study, the authors share concerns of having innovation ecosystems that fixate on scalability and monopolies, opening up discussions on what should and what should not be scaled for public good—the overarching aim of transformative innovation [101]. Another study examines the problems with urgency, and how this negatively shapes the innovation ecosystem, looking at the case of COVID-19 (e.g., [30]).

The fourth key enabler for mission-orientated projects is smart economic growth and investments (n = 13). Although, as outlined above, mission-orientated projects are defined as working towards grand societal problems rather than pure economic growth, most case studies illustrate that having economic growth eases the transition process and causes less resistance from industries and societies. This can be in the form of the need and the desire to create circular and sustainable economies (e.g., [69,76]); strategic investments or "smart specialization" by aligning national and/or regional industrial opportunities with development to ensure both environmental and socioeconomic benefits (e.g., [45,64,102]); and moving from reactive market fixing to proactive shaping and creating markets through public finance (e.g., [80,83]).

The fifth key enabler for transformative innovation is multistakeholder collaboration (n = 8). Although this is linked closely to other categories, such as research and innovation ecosystem, it is very specifically discussed as one of the chief enablers; hence, it has its own category. Studies discuss collaboration between researchers, industry actors, and different, especially underrepresented, citizen groups such as women and youth, as well as participatory or "bottom-up" contributions (e.g., [44,86,92]) or regional or international collaboration and cooperation (e.g., [70,73]), and public and private partnerships to maximize effectiveness (e.g., [59]).

The sixth key enabler for mission-orientated projects was governance (n = 5). Studies highlighted the importance of overarching political leadership visions and government plans, agendas, and strategies towards sustainability goals and alleviating grand societal challenges (e.g., [45,68]).

3.4. Governance Models and Policy Cycles

Four types of governance models were identified, including collaborative, government-led, public–private partnership, and regional collaborative approach. Also, policy cycle was analyzed to map the stage where MOIP was conceived (problem definition, agenda setting, formulation, implementation, and evaluation). The following outlines the governance models for MOIP as shown in Table 7.

Table 7. Types of governance models in this review.

Governance Models	Description	Examples from the Selected Literature
Collaborative approach	A framework where multiple stakeholders, including government entities, private sector organizations, civil society groups, and citizens, actively engage in decision making, policy formulation, implementation, and evaluation.	[25]
Government led	A top-down approach is where the central authority, usually the government or a public sector entity, takes the primary responsibility for decision making, policy formulation, implementation, and evaluation.	[23,26,36,40,42–44,49,58,63,83]
Private–public partnership	A collaborative arrangement between government entities and private sector organizations to jointly finance, develop, and deliver public infrastructure, services, or projects.	[33,54]
Regional collaborative approach	A framework where multiple jurisdictions, such as cities, counties, or provinces, within a specific geographic region cooperate and work together to address common issues and challenges.	[39,87]

Different forms of governance model were discussed in the literature, which illustrates that there is no one-size-fits-all solution but that it is possible to adapt the governance model depending on the context.

Table 8 outlines the stages of policy cycle (problem definition, agenda setting, formulation, implementation, and evaluation). The results indicate that a MOIP framework is crucial at all stages of the policy cycle.

Table 8. Stages of policy cycle in MOIP in this review.

Policy Cycle	Examples of Applications
Problem identification and definition	• Design of initiatives and overarching strategies [33] • Policy reform and institutional arrangements [39] • Investing along the innovation chain [83] • Translating outcomes of foresight into policy frames [87]
Agenda setting	• Problem-based governance targeting societal challenges and innovation governance [40]
Policy evaluation	• Structural funds for contextualizing learning and evaluation systems [43] • Capacity for government to harness organizational learning [58]
Policy formulation	• Applying multilevel governance models to create coherent policies to scale up bottom-up solutions [42] • Analyzing insights from users about food systems and climate change [44] • Framing sustainability transitions to address the goal of decarbonization [49]
Policy implementation	• Innovation policies in tourism [63] • Collaborative and multi-actor approach to address grand challenges [26]

4. Results Summary

This review summarizes drivers, enablers, governance models, and stages of policy cycle for MOIP. This research highlights the value for articulating MOIP to address societal grand challenges. It was argued that adequate solutions to "wicked" problems require new framing of problems by co-defining clear objectives and articulating a portfolio of projects based on multistakeholder dialogue. Informed by the global experience of applying MOIP, GCC nations can adopt MOIP as a strategy for transforming the economy and leapfrog economic development through alignment of national dynamic capabilities to induce breakthrough innovation in key sectors. Based on this systematic literature review, the following summarizes the drivers, enablers, governance models, and stages of policy cycle for MOIP.

The key drivers identified include grand societal challenges (GSCs) which represent social and environmental issues that transcend national borders such as poverty and climate change and are characterized by complexity, uncertainty, and multiplicity. Another driver includes the climate–environment nexus, which addresses mitigation of climate change and environmental conservation. The third category of drivers is referred to as technological development including innovation, entrepreneurship, and research, which is intended to provide incentives for market opportunities for innovative enterprises through designing new governance models, policies, and programs to foster technological development. Sustainability transitions and circular economy was identified as the fourth category of drivers. These included fiscal policies, and market-creating policies to increase macroeconomic stability, circular economy, and economic diversification. Public health and pandemics were the fifth category of drivers. The sixth category of drivers was the UN's 2030 Agenda for the SDGs followed by the seventh category on market failure or crisis-driven events such as the COVID-19 pandemic. The remaining three drivers were global competition, the food–environment nexus, and spatial development.

A set of enablers for MOIP were identified including innovation policies that focus on systemic problems and societal challenges and are underpinned by technological diffusion; empowerment of smaller actors; collaboration of stakeholders; and feedback loops and foresight. Technological diffusion is enabled by effective policies to foster innovation. The linear innovation model is underpinned by investment in R&D to spur economic growth (technology push). However, interactive and network innovation models explain how market pull and technology push interact to induce economic growth and competitiveness. A key example of MOIP is the transition to green energy against conventional fossil fuel industries through working within existing structures and the leverage of intellectual and institutional assets.

Additionally, symbiosis between big industries and SMEs through economic incentives is a key enabler for MOIP. Empowering SMEs through financing technology-based startups plays a key role in inducing open, radical, or disruptive innovations. Informed by evolutionary theory, innovation policy to support green technology was based on supporting a wide range of local grassroots initiatives to foster innovation through diversity and accumulation. A key enabler for MOIP is stakeholders' collaboration, which encourages co-creation and emphasizes the role of R&D institutions, private sector, and "catalytic" governance to initiate an innovation process that is guided by government support.

Creating a shared understanding of wicked problems requires multistakeholder dialogue to co-define root causes and devise solutions. Therefore, policies are instrumental to facilitating a high degree of coordination amongst different stakeholders. On the other hand, strict regulations and environmental regulations can be an enabler for innovation since it opens space for innovative solutions. However, destabilization policies must be balanced with incentives with other alternative feasible options to avoid spillover effects. Moreover, research, foresight, learning, and feedback loops are critical factors to informing innovation policies.

It was argued that it is imperative to integrate a human-centered approach in scientific research to assess social impact and to encourage evidence-based practices by the public

and policymakers in key sectors like education, healthcare, and agriculture. Another key enabler for mission-orientated innovative policy is to support industry–academia collaboration through the provision of an enabling innovation ecosystem supported by transdisciplinary education.

Strategic investments in ICT infrastructure, business environment, and legal systems are key enablers that are augmented by aligning industrial opportunities with national development agenda to ensure sustainability [40,45,102]; and moving from reactive market fixing to creating markets [80,83]. Additionally, this review identified multistakeholder collaboration [44,86,92] or international collaboration [70,73], private partnerships [59], governance, and leadership [45,68] as key enablers for a transition to sustainable economy.

In terms of governance models, different models were identified including the government-led model, collaborative approach, private–public partnership, and regional collaborative approach. In terms of policy cycles, the MOIP framework must be applied to all levels of the policy cycle for maximum effectiveness.

5. Discussion

In order to see how the above can apply to the GCC context, it is important to first briefly discuss current innovation practices and metrics and then identify the gaps.

5.1. Innovation Metrics in the GCC

The GCC region is currently undergoing tremendous social and economic change as they attempt to "leapfrog" from a hydrocarbon-based economy to a knowledge-based economy. This formidable task has led to ambitious national visions and plans and large-scale developmental projects and reforms including R&D infrastructure, green and smart cities, energy transitions, and service innovation in logistics and aviation. They have developed national strategies that aim to achieve economic diversification and seek investments in circular economic practices and sustainable energy to reduce their reliance on the hydrocarbon sector. The GCC economies initially began on high carbon-based growth and consumption models. Despite showing some reluctance at the beginning, similar to other developing countries, GCC countries are now committed to global sustainability agendas, incorporating SDG goals in their national visions and strategies. To this end, GCC governments are investing significant resources in building innovative ecosystems as innovation and education are widely touted as fundamental drivers for economic diversification and sustainable development.

According to the Global Innovation Index (GII), the GCC region is steadily improving with the UAE taking the lead. The GII measures key innovation indicators and developments with the objective to support countries in strengthening their innovation ecosystem. Through measuring 132 economies, it is at the forefront of tracking recent global innovation trends [105]. Table 9 below shows the GCC countries and their GII index ranking over the last few years. The UAE is not only taking the lead within the GCC, but regionally, within the North African and West Asian region (including the island economies), it ranks third. The most recent GII report also highlights the notable improvements of Saudi Arabia, Qatar, Kuwait, and Bahrain in moving up the ranks, albeit with fluctuations due to the recent COVID-19 pandemic, which caused major social and economic disruption.

Table 9. GCC GII ranking.

Country	2018	2019	2020	2021	2022
United Arab Emirates	38	36	34	33	31
Saudi Arabia	61	68	66	66	51
Qatar	51	65	70	68	52
Kuwait	60	60	78	72	62
Oman	69	80	84	76	79
Bahrain	72	78	79	78	72

Source: adapted from World Intellectual Property Organization reports [105,106].

Innovation is occurring in multiple sectors. According to a 2020 report by *The Economist*, companies in the GCC are integrating advanced technologies, mainly artificial intelligence, the Internet of Things, and blockchain, to develop and provide innovative products and services to their respective markets and consumers [107]. In one of the most digitally "switched-on" regions in the world, business leaders are recognizing advanced digital technologies as a source of future growth. As the report points out, effective digitalization can only work if it is supported by legislative and regulatory ease. The UAE stands out as leading the way in supporting the diversification of its economy. In terms of the "ease of doing business" score, Saudi Arabia ranked the world's most improved economy and Bahrain and Kuwait featured in the top ten most improved [107].

Relative to OECD countries, GCC governments have more resources and less political restraint, allowing them to roll out these schemes more effectively. The public sector in the GCC is extensively integrating transformative innovations in its processes including national e-government portals, digital authentication, and public service ratings. Partnerships with the private sectors are gradually increasing.

In terms of energy transition, the largest area for innovation is the energy industry. The chemical and petrochemical sector in the GCC is adopting fast paced research approach that focuses on reducing crude oil dependencies. This has led to partnerships between universities and industry players. One of many examples is the Dammam Valley launching Bio-Tech Start-ups program in collaboration with Imam Abdul Rahman bin Faisal University and Saudi Aramco. Collaborations between Saudi and international researchers and industry actors to achieve carbon neutrality coined the concept of circular carbon economy (CCE). Interest in initiatives that promote energy transition has induced heavy investments in electrical cars, locally grown produce, and various circular economy programs across the GCC.

5.2. Recommendations

There is no doubt that in the GCC context, the drivers for MOIP are visibly present and consciously acknowledged. Being a significant player in the energy market, the national visions for all GCC countries have sustainable diversified economies with clean energy at their heart. This has resulted in the burgeoning of spending on research, investment, and effective policies encouraging innovation across all sectors—all enablers found to be critical in this SLR. This has resulted in GCC countries rising in innovation and ease of business ranks as discussed above. However, it seems that two key enablers are particularly weak, namely a regional innovation ecosystem and stakeholder collaboration outlined below.

5.2.1. GCC Regional Innovation Ecosystem

It is vital to establish an innovation ecosystem that entails educational institutes, industry actors, and a wide variety of stakeholders, as outlined in this review. The GCC, however, should focus on developing a regional innovation system that could leverage the national capabilities. One major recommendation is to invest in human and institutional capital. Developing indigenous human capital and training is vital to a knowledge-intensive, non-oil economy. Strengthening regional ties and therefore building deep internal connections between regional industry actors, educational institutes and nongovernment actors would foster innovative performance. Regional programs could streamline investments and promote a better sense of directionality. In sum, two key enablers of mission-driven innovation found in this SLR include research and strategic investments. Targeted regional research agendas would exponentially increase output, as it would tap into regional resources and innovation networks, especially in sustainable energy. Harnessing networks through sharing resources and partnerships would have ripple effects in the GCC and indeed the wider MENA region. Local economies can enhance their agility and resilience by adopting transformative circular economy processes including green supply chains. Moreover, based on best practices in the reform of legislation and policies in UAE, the region could build on enablers of MOIPs in this review to enhance dynamic capabilities.

5.2.2. Stakeholder Collaboration

Multistakeholder collaboration was identified as a key enabler in this SLR. MOIP addresses grand societal challenges that are characterized as "wicked" problems, which require the input of multiple stakeholders to find innovative and socially acceptable pathways forward. According to one OECD report on innovation in GCC countries, one of the strengths of the GCC has been its *lack* of community involvement, which allows the government to implement changes relatively quickly and swiftly. This condition puts GCC governments under less political restraint and affords them more space to trial and push through public sector innovation.

However, with demographic shifts and globalization, the GCC is undergoing a unique demographic period, making it a critical opportunity. While majority of the Western world is experiencing population decline, the GCC is undergoing a unique demographic period, making it one of the most youthful regions in the world. This youth bulge is a critical challenge as well as a critical opportunity. This new cohort is the most educated, tech-savvy, globally aware, and connected generation and make up the region's largest age demographic [108]. This is paving the way for more demands for information, consultation, and participation and enhances opportunities for SMEs and the private sector. The development of the region's human capital generates higher creativity and productivity, represents a source of economic growth, and accelerates the region's development. Hence, it is recommended that developing nations adopt MOIP through co-definition of core problems across sectors and framing collective solutions to deal with constraints related to path dependency.

5.2.3. Governance and Policy Models

This SLR found that MOIP framework must be applied to all stages of the policy cycle to maximize effectiveness. Therefore, reimagining how policies are created and implemented to make it more agile and transformative, at least for some pilot projects as a trial, could prove fruitful in the GCC. What is interesting, however, is that all governance models were found in this study. This means that policymakers, their attitudes, frameworks, and actions, rather than governance, need to be the main focus.

5.3. MOIP towards Achieving SDGs in the GCC Region

The SDGs, also known as the global goals, are markedly different to their predecessor, the Millennium Development Goals (MDGs), in that they are designed for all countries. That being said, each region has its own unique set of challenges, resources, and opportunities. Through the lens of the GCC context, targets range from irrelevant to highly critical. For example, part of SDG 11, sustainable cities and communities, is target 11.7.2, safe city spaces. Some cities in the GCC are ranked as some of the safest cities in the world [109], but target 11.3.1, sustainable urbanization and 11.6.2 urban air pollution, is of significant importance to a region with high rates of urbanization and low uptake of public transport. According to the national visions and strategic documents, Al-Saidi has categorized all SDG targets ranging from highly to moderately critical to those with moderate or little relevance to the GCC [110]. Out of those identified as significant, SDG 9 is perhaps the most relevant for MOIP, as this goal specifically focuses on fostering innovation. Yet, the following SDGs would also highly benefit from an MOIP framework in working towards their achievement as innovative ideas and technologies is a key component of its progress:

- SDG 6: Clean water and sanitation;
- SDG 7: Affordable clean energy;
- SDG 12: Responsible consumption and production;
- SDG 13: Climate action;
- SDG 14: Life below water.

6. Conclusions

Global complex challenges have reinvigorated and revamped discussions and theories of mission-oriented innovation, namely innovation that is directed and steered towards a particular outcome that meets sustainable development goals and standards. Many countries, particularly in Europe, are actively partaking in mission-orientated projects and establishing regional and international innovation ecosystems. The GCC region is undergoing tremendous change in the hope of achieving their ambitious national visions for which innovation is key. From assessing the current state of the art in this field, this paper synthesized the main drivers, enablers, governance models, and policy cycles that enable effective MOIP according to recent case studies. It found that the GCC region has the main drivers, namely an unsustainable rigid economy that must be transformed and diversified with national visions and strategies to this end. It also has some major enablers in place such as funding, investment, and research. However, much is carried out on a national scale as opposed to regional. This study found that innovation ecosystems where resources, ideas, and human capacity are shared is an important enabler. All GCC states are individually putting in major efforts towards innovation and thus the first recommendation is the development of a strong GCC regional innovation ecosystem. This would significantly streamline activities resulting in faster and better outcomes. Stakeholder management is another key enabler found in this SLR that is currently missing. With demographic shifts leading to a younger, digitally savvy, and more engaged population, the second recommendation is better stakeholder engagement and management that will be necessary for higher forms of creativity and less frustration, especially amongst the youth. Furthermore, rather than governance models, which this study has not found to be pivotal, MOIP frameworks implemented at all stages of the policy cycle is another important recommendation this study has uncovered.

Supplementary Materials: The following supporting information can be downloaded at https://www.mdpi.com/article/10.3390/su151713101/s1, Table S1: PRISMA 2020 Checklist.

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