

**MARINE SPATIAL PLANNING THROUGH
MANAGEMENT LINKAGE APPROACH**

ALBOTOUSH REDA ABDEL AZIZ SALEM

UNIVERSITI SAINS MALAYSIA

2022

**MARINE SPATIAL PLANNING THROUGH
MANAGEMENT LINKAGE APPROACH**

by

ALBOTOUSH REDA ABDEL AZIZ SALEM

**Thesis submitted in fulfilment of the requirements
for the degree of
Doctor of Philosophy**

June 2022

ACKNOWLEDGEMENT

First and foremost, my sincere glorifications and adorations go to almighty Allah for his guidance, protection and strength over me to complete my research study. I would like to express sincere gratitude to my supervisor Professor Dato' Dr Aileen Tan Shau Hwai for her insightful guidance throughout the entire period of my research.

I wish to acknowledge and thank Mr Ir. Zainuddin bin Yusoff, Director of River Basin and Coastal Zone Management Division in Penang and his staff in facilitating the collection of data for this research, particularly during the preparation of Chapter 5. In addition, I am so thankful for all related departments in Malaysia who have helped in collecting data for this research such as Maritime Institute of Malaysia (Cheryl Rita Kaur), Environmental Consultants Sdn Bhd (Professor Dato Zubir Din), Town and Country Planning Department (Khadijah Bt Abd Karim), Jabatan Alam Sekitar Pulau Pinang (Mr Suffian Jul Muhammad), Economic Planning Unit of the Prime Minister's Department (EPU), Penang Development Corporation (PDC), Fisheries Research Institute (FRI), Ministry of Natural Resources and Environment (NRE), and Marine Department Northern Region.

I would especially like to thank my family, namely my wife Zainab, who has been extremely supportive of me throughout this entire process and has made countless sacrifices to help me get to this point and my children. Indeed, without Allah and my parents' prayers, I could not have completed this research. Finally, thank you to all my friends in Malaysia, Jordan and those who support me in every aspect during my research.

TABLE OF CONTENTS

| | |
|--|-------------|
| ACKNOWLEDGEMENT | ii |
| TABLE OF CONTENTS..... | iii |
| LIST OF TABLES..... | vii |
| LIST OF FIGURES..... | ix |
| LIST OF ABBREVIATION | xii |
| LIST OF APPENDICES..... | xvi |
| ABSTRAK | xvii |
| ABSTRACT | xx |
| CHAPTER 1 INTRODUCTION..... | 1 |
| 1.1 Land Sea Connection | 1 |
| 1.2 Integrated Coastal Zone Management (ICZM) and Marine Spatial Planning (MSP)..... | 2 |
| 1.3 Problem Statement | 4 |
| 1.4 Objectives | 6 |
| CHAPTER 2 AN AUTHORITY FOR MARINE SPATIAL PLANNING (MSP) A SYSTEMATIC REVIEW..... | 8 |
| 2.1 Introduction..... | 8 |
| 2.2 Methodology | 12 |
| 2.3 Results..... | 16 |
| 2.3.1 Status of MSP’s Authority Publications | 16 |
| 2.3.2 MSP’s Authority, Institutional Arrangements, and Governance Approaches (GA) | 21 |
| 2.3.2(a) Authority | 22 |
| 2.3.2(b) Institutional Arrangements | 23 |
| 2.3.2(c) Governance Approaches (GA) | 24 |
| 2.3.3 The Trans-Boundary Nature of MSP: Reasons, Challenges and Recommendations | 27 |
| 2.3.4 Tools in Support of MSP | 28 |

| | | |
|-----|-----------------|----|
| 2.4 | Discussion..... | 32 |
| 2.5 | Conclusion..... | 35 |

CHAPTER 3 MANANGEMENT AUTHORITY OF MARINE

| | | |
|-------|---|-----------|
| | SPATIAL PLANNING (MSP)..... | 38 |
| 3.1 | Introduction..... | 38 |
| 3.2 | Literature Review..... | 39 |
| 3.3 | Methodology..... | 42 |
| 3.4 | Results..... | 46 |
| 3.4.1 | Step 1 Identifying the problem situation (What?) and Step 2 Expressing the problem situation (Why?)..... | 47 |
| 3.4.2 | Step 3 CATWOE | 53 |
| 3.4.3 | Step 4 Conceptual Model..... | 54 |
| 3.4.4 | Step 5 ‘Real world’ comparison..... | 58 |
| 3.4.5 | Step 6 Recommendation | 61 |
| 3.4.6 | Step 7 Implementation | 63 |
| 3.5 | Discussion..... | 63 |
| 3.6 | Conclusion | 67 |

**CHAPTER 4 LINKING/INTEGRATING MARINE SPATIAL
PLANNING (MSP) AND INTEGRATED COASTAL
ZONE MANAGEMENT (ICZM).....**

| | | |
|----------|--|-----------|
| | | 69 |
| 4.1 | Introduction..... | 69 |
| 4.2 | Literature Review..... | 71 |
| 4.3 | Management Plan’s Linking/Integrating Methodology (MPLIM) | 74 |
| 4.3.1 | Analytical Approach to the Methodology..... | 74 |
| 4.3.2 | Steps of MPLIM..... | 78 |
| 4.4 | Implementing MPLIM on ICZM and MSP | 82 |
| 4.4.1 | Calls and reasons for attempting to link MSP and ICZM..... | 82 |
| 4.4.2 | Linking the ICZM and MSP plans using MPLIM | 85 |
| 4.4.2(a) | Identifying potential sectors for linkage..... | 85 |
| 4.4.2(b) | Evaluation of ICZM and MSP plans which are to be linked or integrated | 87 |

| | | |
|----------|---|----|
| 4.4.2(c) | Identification of the differences between the MSP and ICZM plans | 90 |
| 4.4.2(d) | Recommendations and link | 93 |
| 4.5 | Discussion | 95 |
| 4.6 | Conclusions..... | 97 |

CHAPTER 5 EVALUATING INTEGRATED COASTAL ZONE

MANAGEMENT EFFORTS IN PENANG MALAYSIA .99

| | | |
|----------------|---|-----|
| 5.1 | Introduction..... | 99 |
| 5.2 | Literature Review..... | 102 |
| 5.2.1 | History of the legislation and planning of coasts in Penang and Malaysia | 104 |
| 5.2.2 | Boundaries and governance of coastal zone in Penang | 113 |
| 5.2.3 | Review of the methods and critiques | 119 |
| 5.3 | Methodology | 124 |
| 5.3.1 | Presentation of Research Methodologies..... | 124 |
| 5.4 | Results..... | 127 |
| 5.4.1 | Part 1: Evaluation of Penang ICZM Based on Billé (2007)..... | 127 |
| 5.4.1(a) | Issues..... | 127 |
| 5.4.1.(a)(i) | Vertical Integration..... | 127 |
| 5.4.1.(a)(ii) | Horizontal Integration | 128 |
| 5.4.1.(a)(iii) | What regulation needs can be diagnosed for managing conflicts over natural resources and space? | 129 |
| 5.4.1.(a)(iv) | What are the environmental problems?.. | 130 |
| 5.4.1(b) | Instruments | 133 |
| 5.4.1(c) | Retrospective | 135 |
| 5.4.1(d) | Implementation..... | 136 |
| 5.4.1(e) | Integration Diagnosis..... | 139 |
| 5.4.1(f) | Evaluation..... | 140 |
| 5.4.2 | Part 2 Evaluation by Coastal Sustainability Standard (CoSS) Adopted from Gallagher (2006)..... | 141 |
| 5.4.2(a) | Planning Principle..... | 141 |
| 5.4.2(b) | Participation Principle | 144 |

| | |
|--|-----|
| 5.4.2(c) Communication Principle | 145 |
| 5.4.2(d) Integration Principle | 147 |
| 5.4.2(e) Responsibility Principle..... | 149 |
| 5.4.2(f) Balance Principle | 152 |
| 5.5 Discussion | 154 |
| 5.6 Conclusion | 157 |

**CHAPTER 6 CONCLUDING REMARKS AND
RECOMMENDATIONS FOR FUTURE WORKS.....159**

REFERENCES..163

APPENDICES

LIST OF PUBLICATIONS

LIST OF TABLES

| | | Page |
|-----------|--|-------------|
| Table 2.1 | Research questions and the objectives | 10 |
| Table 2.2 | Coding and reductionist coding of the reviewed papers | 16 |
| Table 3.1 | Summary of MSP plans from around the globe as taken from the UNESCO MSP website accessed on 20 March 2020. | 40 |
| Table 3.2 | MSP plans from around the globe taken from the UNESCO MSP and European MSP websites accessed on 20 March 2020. | 41 |
| Table 3.3 | Rounds 1,2,3 of Modified Delphi..... | 46 |
| Table 3.4 | Challenges' faced MSP and their possible reasons..... | 50 |
| Table 3.5 | Customers, Actors, Transformation, Worldview, Owners, Environmental constraints (CATWOE) analysis adopted from Soft System Methodology (Checkland, 1989)..... | 54 |
| Table 3.6 | Characteristics necessary of an MSP management authority as deduced from the conceptual model. | 57 |
| Table 3.7 | Characteristics necessary of an MSP management authority as deduced from the root definition (Round 1). Participants were required to choose an answer from the following options 5-Strongly Agree, 4-Agree, 3-Neither; 2-Disagree and 1-Strongly Disagree. | 59 |
| Table 3.8 | Results of the 17 responses to the questionnaire (Round 2) to rate each potential MSP management authority according to the characteristics that the participants had chosen in Table 3.6. Participants were required choose an answer from the following options 5-Strongly Agree, 4-Agree, 3-Neither, 2-Disagree and 1-Strongly Disagree. | 61 |
| Table 3.9 | Results of 12 responses to the questionnaire (Round 3) that ranked the potential MSP management authorities by order of the participant's preference; with 1-Most Preferred and 4-Least Preferred. | 61 |

| | | |
|-----------|--|-----|
| Table 4.1 | Elements of both plans and what do they represent. The elements that appeared after evaluation (b, f) meant to be the elements that are present on papers, yet, missing on ground, due to unknown reasons..... | 76 |
| Table 4.2 | Calls and Reasons for linking MSP and ICZM plans..... | 85 |
| Table 4.3 | Potential elements and components that can be linked..... | 87 |
| Table 5.1 | Detailed review of all legislation, guidelines and studies concerning CZs in Penang and Malaysia (including those applicable to the state of Penang)..... | 109 |
| Table 5.2 | The Legislative Acts concerning sea areas in Penang and Malaysia (applicable to Penang). | 116 |
| Table 5.3 | Review and critique of ICZM evaluation methodologies. Only the first four mechanisms are modified from Gallagher (2010) | 121 |
| Table 5.4 | Description of Planning’s principle criteria..... | 143 |
| Table 5.5 | Description of Participation’s principle criteria | 145 |
| Table 5.6 | The description of Communication’s principle criteria..... | 147 |
| Table 5.7 | The description of Integration’s principle criteria | 149 |
| Table 5.8 | The description of Responsibility’s principle criteria | 151 |
| Table 5.9 | The description of Balance’s principle criteria | 153 |

LIST OF FIGURES

| | | Page |
|------------|---|-------------|
| Figure 1.1 | Shows objectives and flow of the thesis..... | 7 |
| Figure 2.1 | A brief description of the methodology shows the progress of this chapter..... | 14 |
| Figure 2.2 | Shows number of marine spatial planning authority publications per journal | 18 |
| Figure 2.3 | Shows number of marine spatial planning authority publications per year | 19 |
| Figure 2.4 | Geographical areas from a continent perspective were publications were obtained..... | 20 |
| Figure 2.5 | The governance is overarching, as it is the system that controls and directs entities, whereas GA (examples: 1,2,3,4,5,6,7,8) are the various approaches that can be selected to control the various governance entities (authorities) (examples: A,B,C,D,E,F,G,K) within and outside the marine domain, and institutional arrangements (grey arrows) are the ways that authorities are located horizontally and vertically and their relationship with each other..... | 22 |
| Figure 2.6 | Summary of the chapter indicating that currently many authorities types and different governance approaches and tools are controlling MSP, which lead to concluding the main characteristics of MSP authority and the future studies..... | 37 |
| Figure 3.1 | Soft System Methodology (SSM) steps modified as steps 3,4 and 5 were used in conjunction with Modified Delphi Methodology. | 44 |
| Figure 3.2 | Participants' specialties and expertise..... | 46 |
| Figure 3.3 | Problem situation of MSP where marine areas (MSPs 1,2,3) are subjected to varying international, national and local legislations and priorities within the country in addition to a | |

| | | |
|------------|--|----|
| | lack of communication and coordination between neighbouring countries..... | 52 |
| Figure 3.4 | Conceptual model is based on the root definition. It highlights the characteristics necessary of the ideal MSP management authority | 56 |
| Figure 4.1 | Description of how the linkage, integration, and merger functions operate, it has been developed based on the definitions mentioned above. It can be seen that in <i>link</i> each entity is staying as is yet linked with the other entity, whereas in <i>integrate</i> both entities are combined together, nevertheless, each entity still enjoy its own shape and characteristics and maintain its original identity; and finally, in <i>merge</i> both entities lost their shape and uniqueness and they formed one new entity with new shape and characteristics. | 70 |
| Figure 4.2 | The different hypothetical shapes represented different management plans (i.e., 1 and 2). The different geometrical shapes indicated that both the management plans were not identical. The letters (c, d) represented the similar elements that exist in both plans, however, (d) represented the elements that appeared after evaluation. The letters (a, b, e, f) represented the differing elements/components in the plans, however, The elements (b, f) represented the missing elements/components in the management that appeared after evaluation..... | 75 |
| Figure 4.3 | The Union, Intersection and Symmetric difference of two management plans are shown in grey colour (shaded). These plans share the { c, d, c, d } elements and could be effectively linked. The elements { a, b, e, f} represent the different elements which have to be handled independently. Figure 4.2 presents additional details regarding this Figure. | 78 |

| | | |
|-------------|--|-----|
| Figure 4.4 | Summery of the applied MPLIM Steps..... | 80 |
| Figure 4.5 | The linkage between the fishing sector is seen to respect and also address the various sectors. It also considers all recommendations related to the differences. | 94 |
| Figure 5.1 | Map of Malaysia and Penang (in the north-west of Peninsula Malaysia), where the first ICZM plan of Penang was initiated. . | 103 |
| Figure 5.2 | The Malaysian maritime zones and coastal area, (source based on related Malaysian Acts mentioned in Table 5.1) (EEZ 200 nm, TW 12 nm, ISMP 3 nm, LWM Lowest astronomical tide, HWM highest astronomical tide)..... | 115 |
| Figure 5.3 | Integrated Coastal Zone Management key players in Penang | 119 |
| Figure 5.4 | The performance score of the criteria of the Planning’s Principle in Coastal Sustainability Standard | 144 |
| Figure 5.5 | The performance score of the criteria for the Participation’s Principle in Coastal Sustainability Standard | 145 |
| Figure 5.6 | The performance scores for the criteria of the Communication’s Principle in Coastal Sustainability Standard . | 147 |
| Figure 5.7 | The performance scores for the criteria of the Integration’s Principle in Coastal Sustainability Standard | 149 |
| Figure 5.8 | The performance scores for the criteria of the Responsibility’s Principle in Coastal Sustainability Standard..... | 151 |
| Figure 5.9 | The performance scores for the criteria of the Balance’s Principle in Coastal Sustainability Standard..... | 153 |
| Figure 5.10 | The average scores for the Coastal sustainability standards (CoSS) Principles..... | 157 |
| Figure 6.1 | Illustrate overall summary of the thesis with discussion and conclusions..... | 162 |

LIST OF ABBREVIATION

| | |
|--------|---|
| ABNJ | Authority Over Areas Beyond National Jurisdictions |
| AF | Artificial Reefs |
| AHP | An Analytical Hierarchy Process |
| AIS | Automatic Identification Systems |
| C.A.T | Competency, Accountability and Transparency |
| CATWOE | Gross Customers, Actors, Transformation, Worldview, Owners, Environmental Constraints) |
| CBA | Cost-Benefit Analysis |
| CBD | Convention on Biological Diversity |
| CETC | Coastal Engineering Technical Centre |
| CoSS | Coastal Sustainability Standard |
| CRMC | Coastal Resources Management Council |
| CZ | Coastal Zone |
| CZM | Coastal Zone Management |
| DANCED | Danish Co-Operation for Environment and Development |
| DFO | Fisheries and Oceans Canada |
| DID | Department of Irrigation and Drainage |
| DOE | Department of Environment |
| DST | Dempster–Shafer Theory |
| EAM | Ecosystem Approach to Management |
| EBSAs | Ecologically or Biologically Significant Marine Areas |
| EC | European Commission |
| EEZ | Exclusive Economic Zones |

| | |
|--------|---|
| EIA | Environmental Impact Assessment |
| EPU | Economic Planning Unit |
| EU | European Union |
| FA | Fishermen's Association |
| FAD | Fish Aggregating Devices |
| FD | Forestry Department |
| GA | Governance Approaches |
| GDP | Gross Domestic Product |
| GIS | Geographical Information System |
| GOM | Government of Malaysia |
| GT | Governance Tools |
| HELCOM | Helsinki Commission |
| HWM | High-Water Mark |
| ICZM | Integrated Coastal Zone Management |
| ICZMP | Integrated Coastal Zone Management Policy |
| IMO | International Maritime Organization |
| IQR | Interquartile Range |
| ISMP | Integrated Shoreline Management Plan |
| LLS | License Limitation Scheme |
| MA | Maritime Authority |
| MCS | Monitoring, Control and Surveillance |
| MEECC | Ministry of Environment, Energy, And Climate Change |
| MIMA | Maritime Institute of Malaysia |
| MLWL | Mean Low Water Line |

| | |
|--------|--|
| MMZ | Malaysia Maritime Zone |
| MOA | Ministry of Agriculture |
| MOTOUR | Ministry of Tourism |
| MoU | Memorandums of Understanding |
| MPA | Marine Protected Areas |
| MPLIM | Management Plans Linking/Integrating Methodology |
| MPPs | Marine Planning Partnerships |
| MScY | The Maximum Social Yield |
| MSP | Marine Spatial Planning |
| MSY | Maximum Sustainable Yield |
| MTPB | Malaysian Tourism Promotion Board |
| MUs | Management Units |
| NCECC | National Coastal Erosion Control Council |
| NCES | National Coastal Erosion Study |
| NCRMP | National Coastal Resource Management Policy |
| NCZP | National Coastal Zone Policy |
| NGOs | Non-governmental Organizations |
| NMPF | National Marine Planning Framework |
| NRE | Natural Resources And Environment |
| PAM | Prioritized Area Map |
| PDC | Penang Development Corporation |
| PKSD | Putra Konsult Sdn Bhd |
| PNP | Penang National Park |
| PSR | Penang South Reclamation |

| | |
|--------|---|
| RBCZM | River Basin and Coastal Zone Management Division |
| SDG | Sustainable Development Goals |
| SNA | A Social Network Analysis |
| SOP | Standard Operating Procedures |
| SPAF | Stakeholder Participation Assessment Framework |
| SSM | Soft System Methodology |
| SwAM | Swedish Agency for Marine and Water Management |
| TCP | Town and Country Planning |
| TCPD | Town and Country Planning Department |
| TMSP | Trans-Boundary MSP |
| TOC | Total Organic Carbon |
| TSS | Traffic Separation Scheme |
| TWs | Territorial Waters |
| UK | United Kingdom |
| UNCED | United Nations Conference on Environment and Development |
| UNCLOS | United Nation Convention on The Law of Sea |
| UNESCO | United Nations Education, Scientific, Cultural Organization |
| UPC | Urban Planning Council |
| USA | United States of America |
| USM | Universiti Sains Malaysia |
| WQI | Water Quality Index |
| WSM | Waterway Safety Management |

LIST OF APPENDICES

- APPENDIX A Implemented methodology of CoSS Performance
 Scoring for Penang Integrated Coastal Zone
 Management
- APPENDIX B Participant Information Sheet and the Questionnaires

PERANCANGAN RUANG MARIN MELALUI PENDEKATAN LINKEJ PENGURUSAN

ABSTRAK

Kawasan pantai seringkali menjadi pusat kepada sumber dan sasaran pembangunan infrastruktur, namun demikian ia dilihat sebagai kawasan yang kurang ampuh di banyak tempat di dunia. Kawasan ini sering berdepan dengan dilema yang dikaitkan dengan urbanisasi, iklim buruk, dan perubahan alam sekitar untuk organisme hidup, seiring dengan ketiadaan pelaksanaan pendekatan bersepadu dalam menangani isu ini. Maka itu, pendekatan pengurusan yang baru telah cuba dilaksanakan, seperti Pengurusan Zon Pantai Bersepadu atau *Integrated Coastal Zone Management* (ICZM) dan Perancangan Ruang Marin atau *Marine Spatial Planning* (MSP) untuk menguruskan pantai dalam cara yang mampan dan paling berkesan, dan pada masa yang sama menjaga keadaan dinamikinya. Walau bagaimanapun, beberapa cabaran telah muncul, berkaitan dengan pendekatan pengurusan seperti interferens atau gangguan di antara ICZM (sehingga 3-12 nm) dan MSP (sehingga 200 nm) dari persisiran pantai, tidak mengikut pelan yang telah diluluskan (ICZM Pulau Pinang sebagai kajian kes), serta pendekatan rawak yang diambil dalam memilih pihak berkuasa pengurusan dalam kes MSP. Oleh itu, tujuan utama tesis ini adalah untuk membangunkan pendekatan inovatif yang mampu meningkatkan konsep MSP dan pelaksanaannya dengan menjurus kepada objektif-objektif berikut; 1- untuk menilai teknologi terkini (dari seluruh dunia; terutama

teknologi Eropah) yang membentuk pengurusan MSP dan organisasi yang terlibat dengan pelaksanaannya, 2- untuk menentukan organisasi yang paling sesuai sebagai pihak berkuasa MSP, 3-untuk mencadangkan satu metodologi yang menyambungkan/mensepadukan MSP dan ICZM, dan 4- untuk menilai usaha yang dikaitkan dengan ICZM di Pulau Pinang. Keputusan menunjukkan ciri-ciri pihak penguasa MSP, yang dikongsi menerusi borang Google kepada para peserta (Delphi yang diubah-suai); menandakan bahawa Pihak Penguasa Maritim atau *Maritime Authorities* (MAs) di peringkat kebangsaan dan antarabangsa adalah pihak yang tepat. Kedua, satu Metodologi Menyepadukan Pautan Pelan Pengurusan atau *Management Plan Linking Integrating Methodology* (MPLIM) telah dibangunkan; di mana ia terdiri dari lima langkah utama mengenal pasti sektor pautan yang berpotensi; menilai pelan pengurusan untuk dipautkan; mengenal pasti perbezaan dan mengklasifikasikannya kepada tema tertentu; membuat saranan berdasarkan perbezaan dan pautannya. Ketiga, didapati bahawa usaha ICZM di Pulau Pinang terjejas oleh ketiadaan agensi penguasa yang memegang tanggungjawab, tidak mempunyai kesepaduan melintang dan menegak di antara pelbagai sektor dan peringkat (peraturan dan akta berkenaan zon pantai dilaksanakan oleh agensi berbeza di peringkat Negeri dan Persekutuan). Melalui perbincangan keputusan ini, dapat dikatakan bahawa pelaksanaan MPLIM ke atas pelan pengurusan ICZM dan MSP, menunjukkan yang ia mampu menjadi alat yang bagus dalam menghubungkan-kaitkan pelan pengurusan, dan dengan itu, ia melihat kepada proses pautan dari dalam konteks pelan itu sendiri, dan tambahan pula, didapati bahawa ia boleh digunakan sebagai alat untuk meningkatkan

kefahaman kita terhadap isu utama berkenaan ICZM dan MSP. Perbincangan mengenai usaha ICZM di Pulau Pinang, ia bakal menjadi satu alat yang efektif dalam menangani isu kawasan pantai. Kesimpulannya, ia adalah sesuatu yang sangat disarankan, apabila ia diaplikasi dalam menggunakan MPLIM dalam mengaitkan pelan pengurusan untuk mengatasi sebarang kesukaran yang berkait dengan konflik dan gangguan pelan pengurusan. Tambahan pula, dapatan ICZM Pulau Pinang boleh membantu memberi maklumat tentang bagaimana hendak menilai ICZM di peringkat kebangsaan, memandangkan penilaian serantau adalah satu syarat untuk menjalankan penilaian di peringkat kebangsaan. Seterusnya, sebagai kesimpulan, fokus kepada perancangan ruang Marin dengan pendekatan yang berinovatif adalah penting untuk menentukan kejayaannya, dan apa yang diperkenalkan dalam tesis ini tentang pihak berkuasa MSP dan pautannya dengan ICZM boleh menjadi langkah pertama dalam menyelesaikan pelbagai isu dan cabaran dalam mendepani pelaksanaan MSP.

MARINE SPATIAL PLANNING THROUGH MANAGEMENT

LINKAGE APPROACH

ABSTRACT

Coastal areas have always been a ‘hub’ of resources and a target for infrastructure development, yet, considered vulnerable in many parts of the world. And these are often face dilemmas associated with urbanization, adverse climatic, and environmental change for living organisms, along with the absence of the implementation of an integrated approach in managing these issues. Therefore, new management approaches had been tried such as Integrated Coastal Zone Management (ICZM) and Marine Spatial Planning (MSP) to managing coasts in a sustainable and most effective manner while accommodating its dynamism. However, some challenges appeared related to the management approaches' such as the interference between ICZM (up to 3-12 nm) and MSP (up to 200 nm) from the coastline, not adhering to approved plans (Penang’s ICZM as a case study), the random approach of choosing the management authorities in case of MSP. Thus, the main aim of this thesis is to develop innovative approaches capable of enhancing the conceptualization of MSP and it’s implementation by addressing the following objectives; 1- to assess the current state-of-the-art (from around the globe; particularly the European experience) forms of MSP governance and the organizations in charge of implementation, 2- to determine the organization most suited as an MSP authority, 3-To propose a methodology to link/integrate MSP and ICZM, and 4- to evaluate the efforts associated with ICZM in the state of Penang.

The results, firstly, revealed the characteristics of an MSP authority, which had been shared via Google forms to the participants (Modified Delphi); ultimately indicating that the Maritime Authorities (MAs) at national and international levels could be the stray desired. Secondly a Management Plan Linking Integrating Methodology (MPLIM) was developed; comprised of five major steps identifying potential sectors of linkage; evaluating management plans to be linked; identifying differences and classifying them into themes; making recommendations based on the differences and the link. Thirdly, it was discovered that ICZM efforts in Penang were disadvantaged by the absence of an authoritative agency having overall responsibility, lack of horizontal and vertical integration between the different sectors and levels (regulations and acts concerning the coastal zone are implemented by different agencies at State and Federal levels). By discussing the results, it can be said that when implementing the MPLIM on management plans ICZM and MSP, it showed that it could be a promising tool for linking management plans, furthermore, it addressed the linking process from within the context of the plans themselves, in addition, it turned out that it could be used as a tool to enhance our understanding of the main issues related to ICZM and MSP. Speaking of ICZM efforts in Penang, it is close to becoming an effective tool for managing coastal areas. In conclusion, it is highly recommended, when applicable to use MPLIM to link management plans to overcome difficulties related to the conflict and interference of management plans. Moreover, the findings of the Penang ICZM portion would help in providing how to assess ICZM nationally, given that regional evaluation is a prerequisite for evaluation at the national

level. In conclusion, addressing Marine spatial planning with innovative approaches is so vital its success, what is introduced in this thesis MSP' authority and linking it with ICZM could be the first step toward resolving the many challenges and issues encountering MSP's implementation.

CHAPTER 1

INTRODUCTION

1.1 Land Sea Connection

Early humans settled in geographic regions that fulfilled their basic needs and fit their lifestyle. While some preferred deserts, forests, caves, or mountains, only a few chose life by the coast. However, for example, the development of fishing methods and marine transportation has led to an unprecedented increase in coastal populations; as those developments made peoples more attached to and dependents on seas.

Described as a connection between land and sea (Ringim et al., 2016), almost two-thirds of the global population presently lives within 60 km of a coastline (Karimi and Gholamrezafahimi, 2017). Coastlines are often not clearly defined on charts (Kay and Alder, 1998) due to movements (Cicin-Sain et al., 1998) and a highly productive ecosystem (Ringim et al., 2016). The Ministry of Natural Resources and Environment (NRE) Malaysia defines coastal areas as land affected by its proximity to the sea with a landward limit of 5.6 km from its high water mark, and part of the sea that is affected by its proximity to land with a seaward limit of 200 nm beyond the coast to its Exclusive Economic Zone (EEZ) (GOM/DID, 2009).

Although coastal areas around the world have long been known as ideal for infrastructure development and rich with an abundance of assets (Mokhtar and Aziz, 2003), little has been done to preserve it (Pilkington and Mahmoud, 2017). For instance, in the Mediterranean sea, despite rapid urbanisation and adverse climate change in these regions, comprehensive management solutions still do not exist (Prem, 2010). Notwithstanding that some coastal area observed good examples of coastal protection by implementing Competency, Accountability and Transparency in Palau Penang in Malaysia as an example ("Portal Rasmi Kerajaan Negeri Pulau Pinang -

[Portal Rasmi Kerajaan Negeri Pulau Pinang", 2012](#)), in addition to implementing Penang Integrated Shoreline Management Plan 2010, as will be discussed later.

Apart from that, there is increasing competition between many sectors for the usage of ocean spaces ([Sangiuliano, and Mastrantonis, 2017](#)) for transportation, as a food source, as a renewable energy source, to lay undersea cables etc. Thus, new management approaches worldwide had been introduced and implemented to address those challenges and conflicts, such as Integrated Coastal Zone Management (ICZM) and Marine Spatial Planning (MSP).

1.2 Integrated Coastal Zone Management (ICZM) and Marine Spatial Planning (MSP)

Agenda 21; adopted in 1992 at the United Nations Conference on Environment and Development (UNCED) Earth Summit in Rio de Janeiro, Brazil; identified Integrated Coastal Zone Management (ICZM) as a sustainable coastline management mechanism ([Cicin-Sain et al., 1998](#); [Wheeler et al., 2011](#); [Tiller et al., 2012](#)) capable of simultaneously and effectively accommodating the dynamism of the region. The United Nations Convention on the Law of the Sea (UNCLOS), which came into force in 1994, further, reinforced the agenda ([UNCLOS, 1994](#)). Many countries around the globe have adopted ICZM ([Wheeler and Peterson, 2010](#), [Cantasano, et al, 2021](#)) as a framework to holistically bind and drive sustainable coastal management rather than atomistically sector-by-sector. It does not only respects the openness of coastal areas ([Tiller et al., 2012](#)) but every citizen's right of access. This is achieved by involving many organizations in its management ([Cooper, 2011](#)) under the supervision of a single government agency or department ([Cicin-Sain et al., 1998](#); [Tiller et al., 2012](#)). However, as coastal areas are the transition between the land and the sea, management of seas and oceans needs to be coordinated when necessary.

For decades now, ocean areas have been atomistically managed; sector-by-sector or issue-by-issue; which fails to recognize the marine ecosystem as an interconnected whole (Katsanevakis et al., 2011). In 2006, 50 pioneering experts exchanged their ideas and visions at the first United Nations Educational, Scientific and Cultural Organization (UNESCO) Marine Spatial Planning (MSP) workshop in Paris, France (UNESCO-IOC- visited October 2015). The workshop concluded with a call to adopt and practice MSP (Ehler and Douvère, 2009). MSP is defined as the “public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that are usually specified through a political process” (Ehler and Douvère, 2009). MSP is a great management tool for areas with high incidences of human-human conflict and human-environment activity (Douvère, 2008). It was also critical in making ecosystem-based management of sea usage a reality (Douvère, 2008); a move that simultaneously benefits the existing management style while protecting the environment (Gilliland and Laffoley, 2008).

In 2015, Semporna in the state of Sabah, to better protect its rich biodiversity, having embarked on an effort to develop and implement the first ever MSP in Malaysia. And the year after Town and Regional Planning Department Sabah (TRPD) and WWF-Malaysia took the Semporna Marine Spatial Planning (SMSP) to the next level by jointly organizing a consultation with government departments, non-government and the public (Kimberly Chung, Senior Communications and Campaigns Officer, Marine Programme, WWF-Malaysia (Sabah office), 2016 ; Yatim, et al., 2018)

From an economical perspective MSP-based management of marine areas can mitigate investment risks (Schütz and Slater, 2019); as, it allocate zones, and hinder temporal and spatial conflict between deferent sectors.. It can also conserve habitats and species as well as respect the European Union's water protection laws in ocean-based

renewable energy projects (Van Hees, 2019). MSP is a recognised tool for sustainable fishing (Bastardie et al., 2017), marine aquaculture (Craig, 2019), and the sustainable development of marine areas. For instance, MSP implementation is one of the ecological and socioeconomic strategies to protect Caribbean coral reefs in a high-CO2 world (Andersson et al., 2019).

As codified in the 1982 UNCLOS, the existing legal provisions for MSP are limited as it is a relatively new form of ocean governance. As such, while the older UNCLOS does not regulate the newer MSP, it does somewhat limit the scope of its activities (van Doorn and Gahlen, 2018).

However, MSP looks like ICZM in several ways (Queffelec and Maes 2013). For example, both the plans use strategic, adaptive and participatory approaches, which have been integrated into the government agencies and economic sectors (Douvere and Maes 2010). These concepts help in acquiring an ecosystem-based management plan (Queffelec and Maes 2013), which can maximise the compatibilities noted between the human activities and decrease the spatial conflicts noted between nature and human users (Kidd and Ellis 2012). Both these concepts also manage similar areas owing to the overlaps noted between the Territorial Waters (TWs) (under the ICZM focus) and Exclusive Economic Zones (EEZ) (under the MSP focus). Hence, the overlapped regions must be addressed appropriately for avoiding any arising conflicts.

1.3 Problem Statement

Despite a recent abundance of research in this field (Flannery and Cinnéide, 2012; Kidd and Ellis, 2012; Queffelec and Maes, 2013), there is still a room for improvement to overcome the plethora of challenges mentioned in these studies and reports of implemented plans.

While several recent studies have focused on the importance of addressing MSP authority-related issues (Halpern et al., 2009; Álvarez-Romero et al., 2011; Lebel, 2012; Chang and Lin, 2016) apart from a few papers focusing on land-sea interface matters (van Tatenhove, 2017; Diz et al., 2018; Westholm, 2018), none specifically focus on MSP, provide a comprehensive literature review, or focus on addressing governance and authority over marine areas. Although, The UNESCO Step-by-Step Approach for Marine Spatial Planning toward Ecosystem-based Management recommends that the authority responsible for planning and implementing the management plan be established in the very first step of the process. However, the choice of management authority is left at the discretion of existing agencies (Douve, 2010) that results in numerous challenges during the implementation process of MSP.

The ambiguity and lack of research in addressing MSP's authority, believed developing a conflict in addressing the areas shared with Integrated Coastal Zone Management domain. For instance, In Malaysia; the area 3 to 12 nm from the coast falls under the state jurisdiction of ICZM while an area from the coastline up to 200 nm falls under the federal jurisdiction of MSP. This illustrate a possible conflict, thus, several different studies have highlighted the importance of integrating marine areas and coastal area management and planning (Stoms, et al., 2005; Cao and Wong, 2007; Ehler, 2008; Alvarez-Romero et al., 2011; Flannery and Cinnéide, 2012; Kidd and Ellis, 2012; Queffelec and Maes, 2013; Ferreira et al., 2014; Guneroglu et al., 2014; Kerr et al., 2014; Becker-Weinberg, 2015; Saunders et al., 2016), however, there is still no linkage or integration methodology that addresses the management plans based on their outputs (based on the prepared plans themselves). Nevertheless, in investigating a linkage/integration methodology, the need appeared to evaluate management plans to be inked or integrated, accordingly, Penang's/Malaysia ICZM was chosen to be evaluated as a case study, and to highlight the need to ammend evaluation tools to suit the local specificity.

1.4 Objectives

The primary objective of this thesis is to develop innovative approaches capable of enhancing the conceptualization of marine spatial plans and their implementation (Figure 1.1). The specific objectives were:

1. To assess the current status of MSP's authority publications (from around the globe; particularly the European experience) forms of MSP governance and the organizations in charge of implementation, by analyzing other existing studies to determine the characteristics required of an effective MSP authority as well as current methods of governance (Chapter 2).
2. To determine the organization most suited as an MSP authority (Chapter 3).
3. The following questions were investigated:
 - a. What characteristics should an MSP authority possess?
 - b. What degree of governance should an MSP authority possess to successfully communicate and coordinate with national, regional, and international bodies?
 - c. Which organization, from the organizations already involved in MSP implementation, fits the bill?
3. To propose a methodology to link/integrate MSP and ICZM (Chapter 4).
4. To evaluate the efforts associated with ICZM in the state of Penang, (Chapter 5).

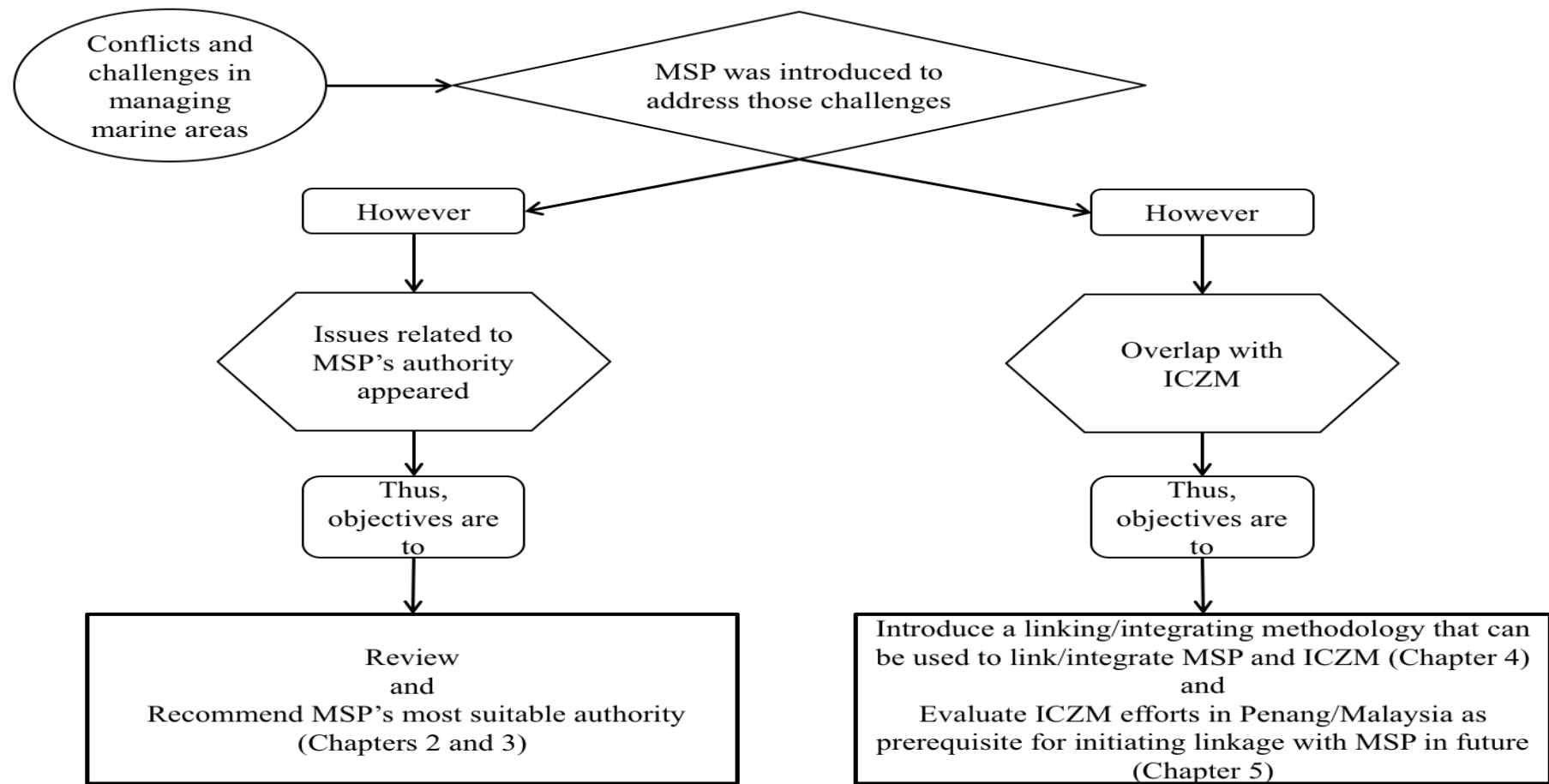


Figure 1.1 Shows objectives and flow of the thesis

CHAPTER 2

AN AUTHORITY FOR MARINE SPATIAL PLANNING (MSP) A SYSTEMATIC REVIEW

2.1 Introduction

The world's oceans have historically been depended upon for maritime activities and are currently relied upon as a source of renewable energy (Tarvainen et al., 2015) resulting computations for space (O'Hagan and Huertas et al., 2016; Sangiuliano and Mastrantonis, 2017), thus, a decade ago, calls were made around the globe for the implementation of marine spatial planning (MSP) to handle and overcome associated issues such as allocation of spaces (de Oliveira and Lucas, 2018; Andersson et al., 2019) in order to boost Blue Growth.

MSP can best be defined as the “public process of analysing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that are usually specified through a political process” (Ehler and Douvère, 2009). Nowadays, MSP is seen as a tool that could make investments less risky (Schütz and Slater, 2019); and adopting ecological and socioeconomic strategies for sustaining coral reefs (Andersson et al., 2019). Moreover, MSP is recognized as a tool for sustainable fishing (Bastardie et al., 2017), marine aquaculture (Craig, 2019), and the sustainable development of marine areas, as well as provide a necessary balance between the habitats, species and water protection rules and Ocean Renewable Energy projects (Van Hees, 2019).

Different challenges have been encountered in the implementation of MSP. Some of these challenges are attributed to the different governance approaches and structures, and the absence or lack of channels of communication between MSP agencies at the national and international level (Morf et al., 2019). In addition, there are differences between the practices of institutional systems (Jay et al., 2016) and, in some cases, the

absence of a competent authority to address problems caused by maritime and land-based activities, and the tension between international conventions and organizations (UNCLOS, IMO, and regional sea conventions) concerning maritime domains. In addition, [Mills et al. \(2015\)](#) identified a “supportive institutional setting”, which, according to [Pressey et al. \(2013\)](#) includes an institutional home for data and the planning process; at least one organization committed to steering the outputs toward outcomes; and establishing and retaining the capacity in the planning, application, and involvement of stakeholders. In practice, these requirements can be difficult to meet because many organizations or many parts of organizations can be responsible for different parts of the planning process.

Recent studies have focused on the importance of addressing issues related to an authority for MSP ([Stoms et al., 2005](#); [Halpern et al., 2009](#); [Álvarez-Romero et al., 2011](#); [Lebel, 2012](#); [Chang and Lin, 2016](#); [van Tatenhove, 2017](#); [Diz et al., 2018](#); [Westholm, 2018](#)). Nevertheless, there is no comprehensive study that focused on addressing governance and authority over marine areas within the national jurisdiction, except for a paper by [Pittman and Armitage \(2016\)](#), entitled “Governance Across the Land-Sea Interface A Systematic Review”, which addressed issues across the land-sea interface and not particularly MSP, and a study by [Gissi et al. \(2019\)](#), entitled “Incorporating Change in Marine Spatial Planning A Review”.

Although, [Charles Ehler \(2008\)](#) argued that, as yet, there is no single solution or unique recipe for the successful implementation of MSP, this study was aimed at carrying out a systematic review of the literature concerning an MSP authority and its related concepts. And the objectives are: outline the status of MSP’s authority publications; identify the characteristics of a leading authority and the institutional arrangements; identify recommendations for MSP’s governance approaches; identify tools and aspects that support MSP and play a role in shaping its authority. Table (2.1) illustrates the research questions and objectives. By doing so, it is believed that this study will

highlight the practices related to an MSP authority and the authority or agency type, and the governance tools and approaches for the implementation of MSP, ultimately highlighting the best practices that can be mainstreamed worldwide. The research begins with a literature review to illustrate the related theory, followed by an overview of the methodology, the results and discussion, and, finally, the conclusions.

Table 2.1 Research questions and the objectives

| Research question(s) | Objective |
|--|---|
| <ul style="list-style-type: none"> • How has the number of relevant publications changed over the study period? • What are the geographical areas of these publications (e.g., geographical focus)? • What are the publishing journals? | To outline the status of MSP's authority publications |
| <ul style="list-style-type: none"> • What are the main characteristics of MSP authorities and its types as discussed in the literature? What are the institutional arrangements and how are they shaped | To identify the characteristics of a leading authority and the institutional arrangements |
| <ul style="list-style-type: none"> • What governance systems are used to implement MSP? • Does MSP need transboundary collaborations? What challenges are encountered in its implementation? | To identify recommendations for MSP governance approaches |
| How do the supporting tools shape the authority of MSP? | To identify tools and aspects that support MSP and play a role in shaping its authority |

At this stage and due to the nature of this chapter its pertinent to define governance and Governance Approaches (GA), institutional arrangement and authority, at least what do they mean within this document. *Governance* is “the system by which entities are directed and controlled (Ruhanen et al., 2010) in other words it is a system and process, not a single activity. Whereas, GA more specifically is interested in the institutional mechanisms through which networks are initiated, stabilized, and terminated (Grabher, 2009). *Institutional arrangements* had been defined by UNDP as the policies, systems, and processes that organizations use to legislate, plan and manage their activities

efficiently and to effectively coordinate with others in order to fulfill their mandate. The oxford definition of *authority* is a person or organization having political or administrative power and control, and the power or right to give orders, make decisions, and enforce obedience, however, within the context of this research the organization is the main concern. However, organizations at national level are linked somehow with the international communities and that linkage should be respected.

At international waters, as codified in the 1982 United Nations Convention on the Law of the Sea (UNCLOS), MSP is a comparatively young form of ocean governance when compared to the UNCLOS (van Doorn and Gahlen, 2018). It holds no authority over Areas Beyond National Jurisdictions (ABNJ). It bears acknowledgement that MSP requires input from public, which is quite impossible with ABNJ since the global population potentially being the public (Altvater et al., 2019). In other words, nations can regulate activities at sea surface and water column up to the limit of EEZ. Beyond that, starts continental shelf zone that is may never exceed 350 nm from the baseline; or may never exceed 100 nm beyond the 2,500-meter isobaths (the line connecting the depth of 2,500 meters) (Article 76 UNCLOS, 1982).

Although in many ways, integrated coastal zone management (ICZM) and MSP go hand-in-hand and any study discussing MSP authority should include ICZM, they differ in many aspects such as

- MSP try not to limit itself (when possible) within political boundaries (Douvere and Maes, 2010) while the ICZM focuses on local specificity; the transboundary nature of MSP means that it consider human activities taking place at remote location, at some cases could be beyond sub-national or national jurisdictions. Speaking of geographical levels of MSP they are either at local, national transboundary nature. Yet, still they are limited by national jurisdiction.

- ICZM is a process-oriented (sectoral) approach that emphasises integration across agencies and sectors, and it rarely addresses the allocation of coastal space for efficient economic development and effective protection of valuable ecological and biological areas (Douvere and Maes, 2010; Smith et al., 2011; Ferreira et al., 2014), thus, it is driven by the significance of competing for environmental protection and economic development (Kerr et al., 2014). Whereas MSP, is focusing at economical activities as priority, yet they should be environmental friendly.
- With regards to geographical scope (for instance in the US and Malaysia), ICZM addresses state jurisdictions (3-12 nm) while MSP addresses federal jurisdictions up to 200 nm.

That is why considering ICZM authority or its approaches could be irrelevant to MSP.

2.2 Methodology

This study performed a systematic review of 230 papers. A systematic review is an organized, purposive approach towards the sampling, analysis and synthesis of literature to meet targeted research questions (Berrang-Ford et al., 2015). It is conducted according to the following steps (1) determine the research questions to guide the review; (2) develop a search protocol (i.e., targeted databases and search terms) to explore the literature databases; (3) screen the results of the literature search based on a predetermined set of criteria; and (4) conduct an analysis and synthesis of the remaining literature (Pittman and Armitage, 2016, Gissi, et al., 2019). The questions guiding the research in relation to the general objectives of the review are elaborated in Table 2.1.

A search of the literature was conducted using two databases (Science Direct and Scopus) in the timeframe of 2003 – 2019. The queries were performed using the

following search string terms ((marine OR maritime) AND (spatial) AND (plan) AND (authority OR governance*)). The queries focused on article titles, keywords and abstracts only, and considered all types of documents. The keywords were chosen for literature samples directly related or referring to MSP as a decision-making process. After removing duplicates from a combination of 110 results in SCOPUS and 159 results in Science Direct, the search of the literature yielded a total of 230 studies. These studies were then screened by reviewing their titles and abstracts, and, when needed, by reading the full article in order to remove irrelevant papers (Figure 2.1).

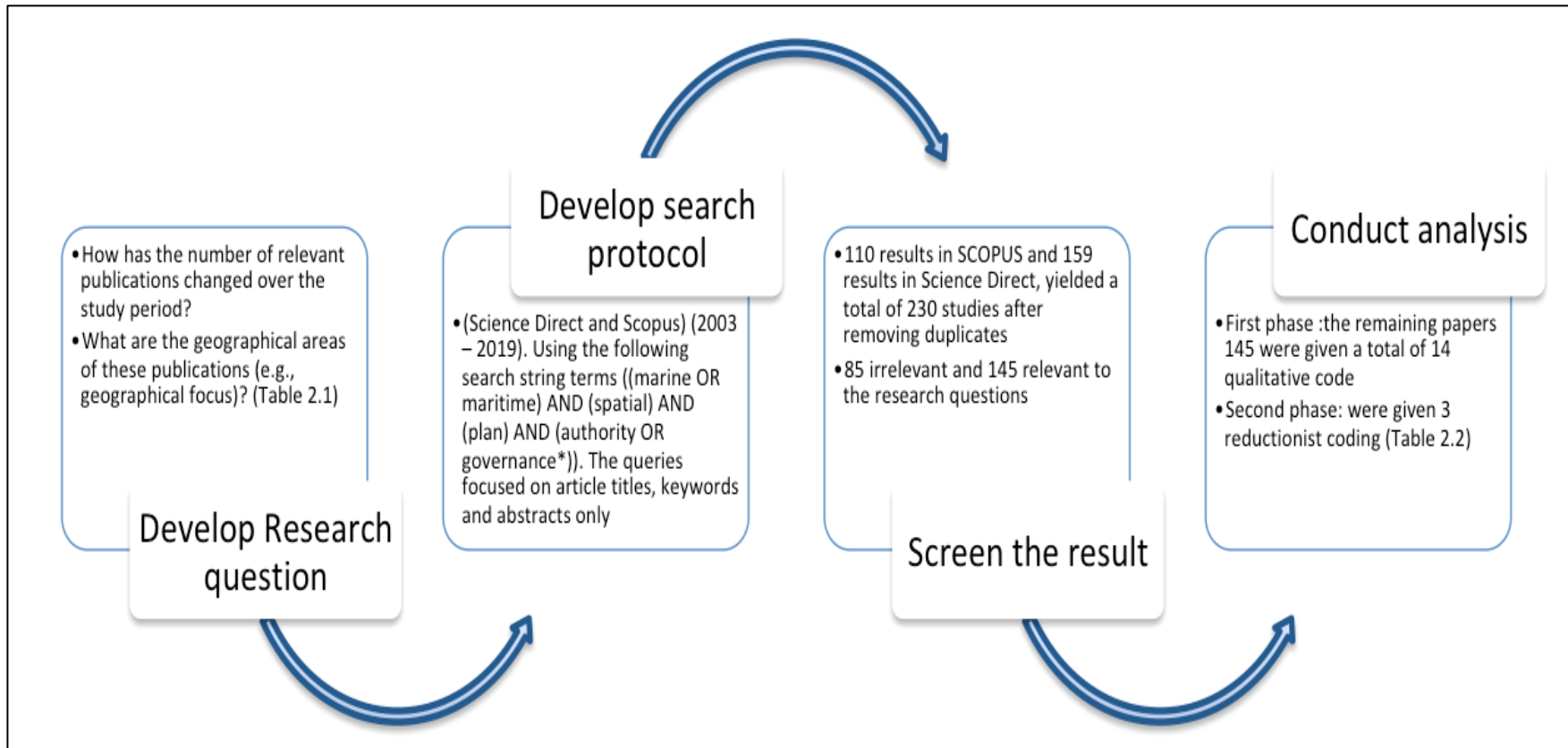


Figure 2.1 A brief description of the methodology shows the progress of this chapter

The papers (n =230) were analysed in three phases, according to a sequential exploratory design (Creswell, 2009). “The method is an approach to combining qualitative and quantitative data collection and analysis in a sequence of phases. In the first phase, researchers collect qualitative data and then analyze the data, the results of which direct the next, quantitative phase, which could be a survey or some other form of quantitative data collection. That is, the qualitative analysis provides critical fodder for developing specific research questions for the quantitative phase, which involve a questionnaire, survey, or other form of quantitative data collection”(SAGE Publications, 2019). The first phase focused on classifying the papers based on their year of publication, which area they addressed or where the authors were from (if it was difficult to identify the geographical domain), and what were the published journals. The second phase involved reading the abstracts (in some cases, the complete paper) to determine the main themes within the papers. This phase involved multiple steps, firstly, identifying important results and the issues being discussed within papers; then in the second step those results were assessed in either they meet the aim of the current paper or not, those which were not within the scope of this study (n=85) were excluded, the irrelevant papers (n=85) were those not related directly to the aim of this chapter; such as those address ecological, biological, aquaculture, as their main focus. And thirdly, the remaining papers were given a total of 14 qualitative code (*calls to use MSP, MSP and Tran-boundary approach, MSP capacity building, MSP deficiencies, MSP governance approach, MSP needs a leading authority, MSP needs enacting new legislations, MSP needs good governance, MSP needs institutional integration, MSP needs international arrangements, MSP needs resources and support, MSP needs to be integrated with maritime safety, review of MSP development, MSP benefits, useful to MSP and others (irrelevant)*), the fourth step involved grouping papers having same code. And finally they were studied thoroughly to answer all research questions (Table 2.2). A more reductionist approach was employed for the coding (authority,

institutional arrangements, and GA ; MSP is trans-boundary by nature, tools and aspects supporting MSP).

Table 2.2 Coding and reductionist coding of the reviewed papers

| No. | Initial coding | Reductionist coding |
|-----|--|--|
| 1 | MSP needs international arrangements | Authority, institutional Arrangements, and Governance Approaches |
| 2 | MSP needs institutional integration | |
| 3 | MSP governance approach | |
| 4 | MSP needs good governance | |
| 5 | MSP needs a leading authority | |
| 6 | MSP and Tran-boundary approach | MSP is Trans-Boundary by Nature |
| 7 | MSP needs enacting new legislations | |
| 8 | Calls to use MSP | Tools and Aspects Supporting MSP |
| 9 | Useful to MSP | |
| 10 | Review of MSP development, | |
| 11 | MSP needs resources and support | |
| 12 | MSP capacity building, MSP deficiencies | |
| 13 | MSP needs to be integrated with maritime safety, | |
| 14 | MSP benefits | |
| 15 | Others (irrelevant)) | |

2.3 Results

This section is divided into four main subsections; firstly, status of MSP's authority publications; secondly, the authority, institutional arrangements and governance approaches (*listing the various approaches that were recommended or used during the preparation and implementation of MSP*); thirdly, the transboundary nature of MSP; and fourthly, the tools and aspects supporting MSP (*listing the issues that are beneficial to MSP as well as the beneficial concepts of MSP*).

2.3.1 Status of MSP's Authority Publications

The state for the art covered only relevant papers (n=145); papers that had been classified while others were excluded (n=85). Two journals dominated the samples (n=114), namely, papers that were published in the Marine Policy Journal (n=81)

represented approximately 57% of the samples, followed by Ocean and Coastal Management (n=33), which represented approximately 23% of the samples. In addition, three papers each were published in seven journals (n=21), which represented approximately 14% of the samples, and the remaining were distributed between two or one article(s) per journal (n=10), which represented approximately 6% of the samples (Figure 2.2).

The year of publication showed an ascending pattern throughout the period of the study, highest peak in 2018 with 32 before decreased to 26 in 2019, which represented (for both years) approximately 40% of the samples, with the minimum number of publications per year being in 2004 (Figure 2.3).

It should come as no surprise that approximately 53% (n=77) of the samples addressed issues on the European continent, followed by 11% focused on North America (n=16). South America (n=10) came in third followed by Africa (n=8). Although Asia is the largest continent, it constituted only 5% (n=7) of the samples. Lastly, only 1% (n=2) of the samples addressed issues in Australia. Papers that addressed the issues faced by multiple continents represented approximately 17% (n=25) of the samples (Figure 2.4).

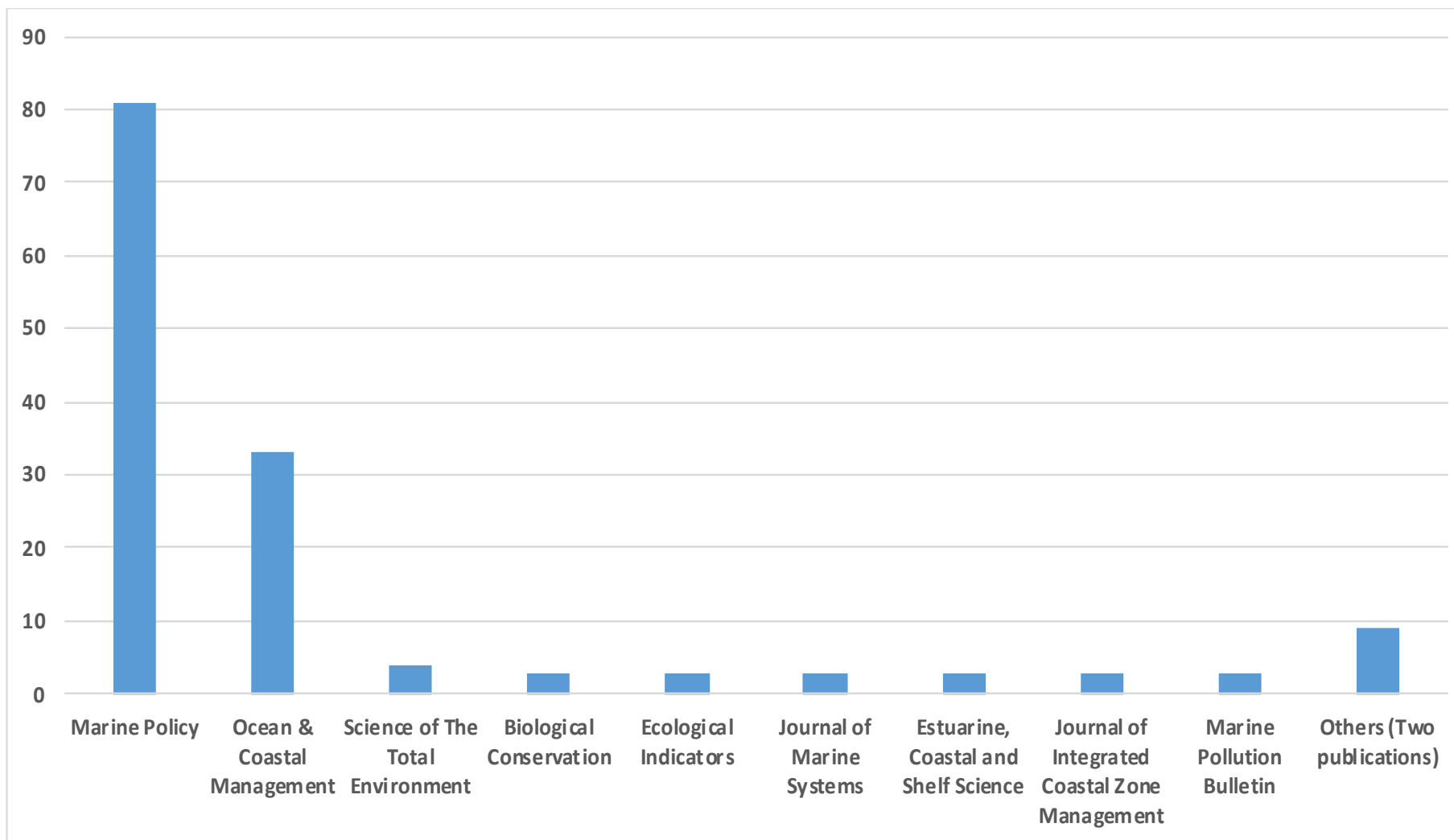


Figure 2.2 Shows number of marine spatial planning authority publications per journal

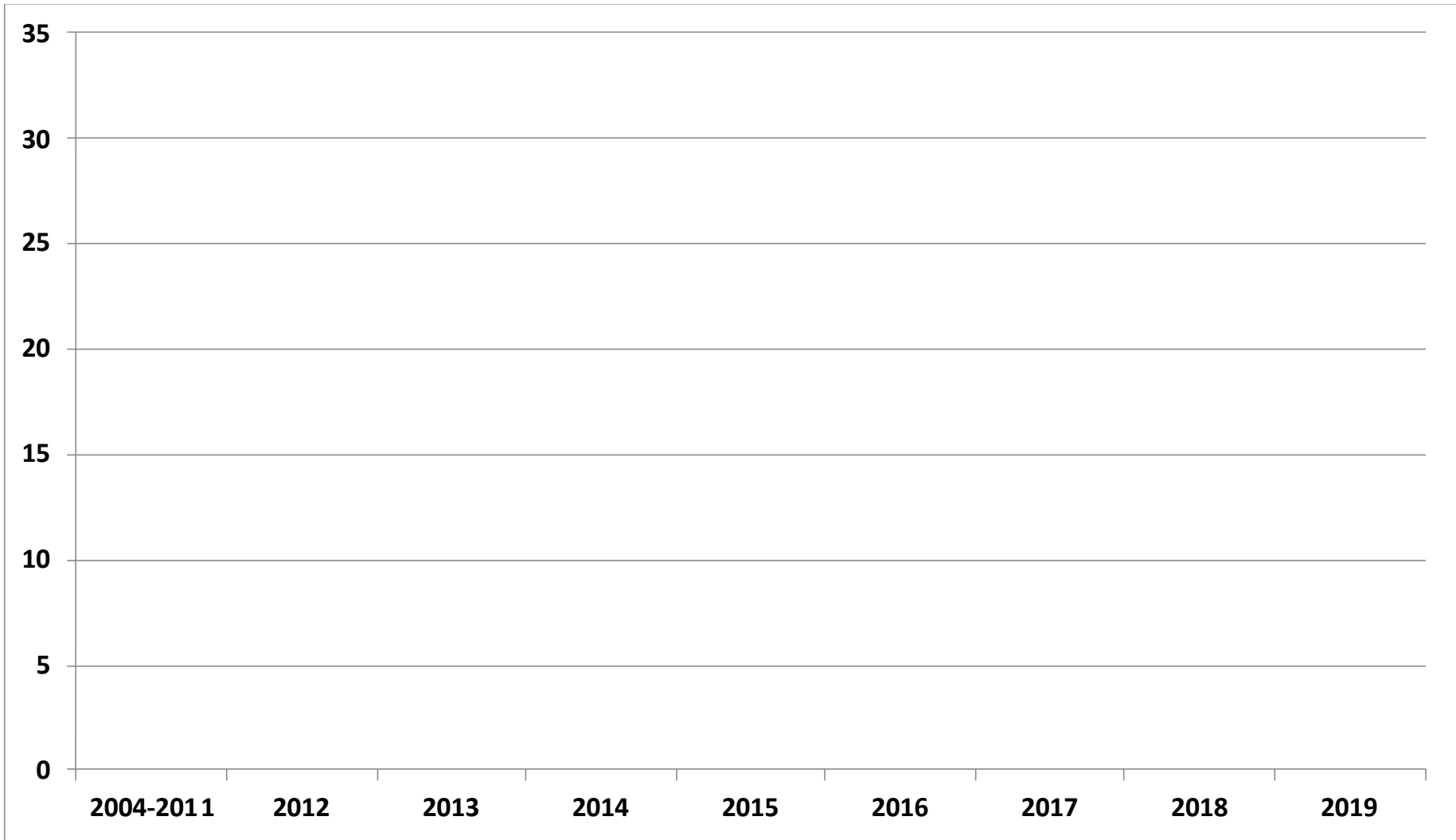


Figure 2.3 Shows number of marine spatial planning authority publications per year

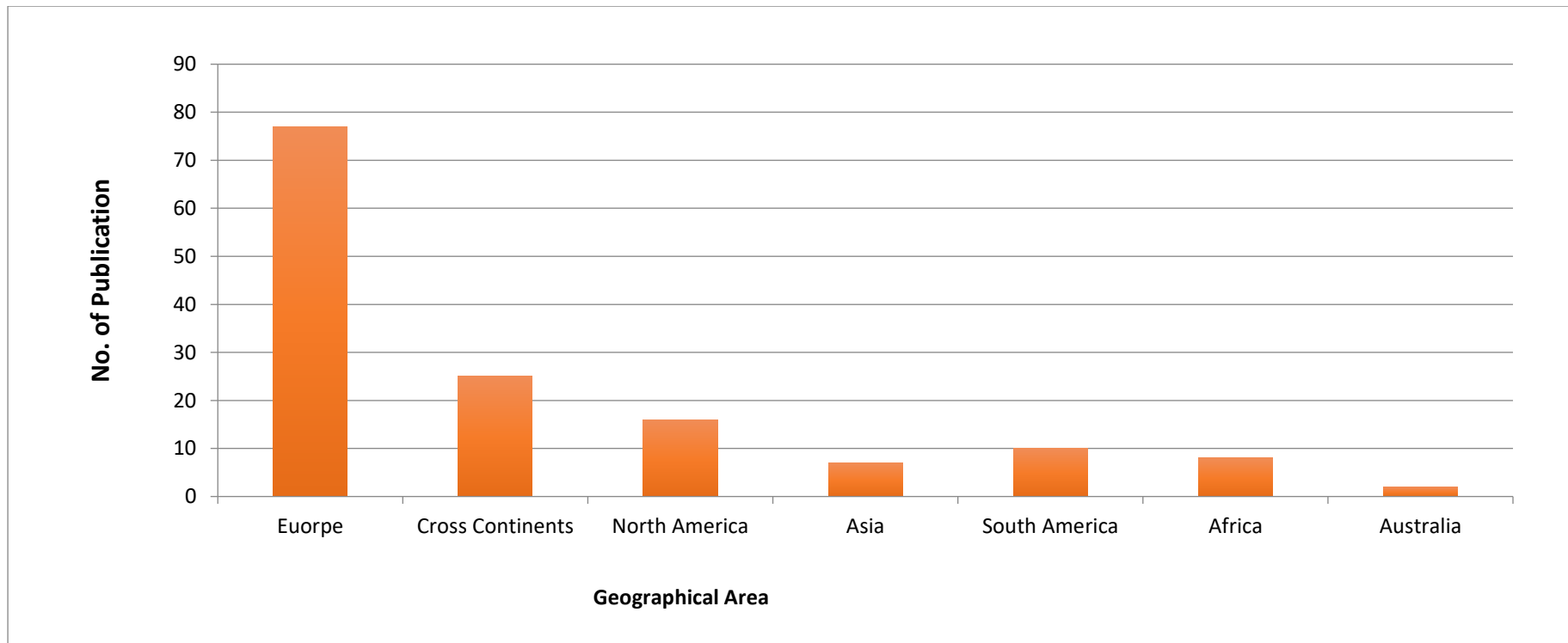


Figure 2.4 Geographical areas from a continent perspective were publications were obtained

2.3.2 MSP's Authority, Institutional Arrangements, and Governance Approaches (GA)

Due to the fact that authority is, by all means, part of a governance system, this section was arranged from the bottom to the top, starting with the authority, and going up the scale to the governance. Figure 2.5 shows the relationship between the authority, institutional arrangements, and GA. From the figure, it can be deduced that the authority in charge of implementing MSP could be one of any of the authorities/agencies/ departments/ organizations (which are represented by the letters from A to K) and they are part of the governance system. However, the relationship between all agencies at the same level and stakeholders as well as higher departments and ministries is either horizontally or vertically and cooperation between those authorities are governed by the institutional arrangements imposed by that governance system. In addition, the main driver of all these systems and their priorities is moulded by any one of the executed GA (which are represented by the numbers from 1 to 8). Thus, this section will attempt to list what has been said regarding the authority, institutional arrangements as well as GA of MSP, and highlight the needed linkages.

The authorities/agencies/departments/organizations in any particular country represented by letters A to K, are those who are being responsible/in charge of any marine related activities, such as Fishing, Tourist, Diving, Marine Parks, Coastal settlement and hotels, Renewable energy, International sea trade, Port Terminals, Coastal industry/ power stations, Marina Offshore, Oil/gas rig and undersea pipelines, and Military activities, e.g., air-to-sea firing range.

The GA represented by the numbers 1 to 8 could be any of ecosystem approach, hybrid operational model (HOM) to manage marine activities by combining a cost-benefit analysis (CBA), an analytical hierarchy process (AHP), and the Dempster–Shafer theory (DST). *Transition management* approach (TMA), Marine governance approach

(MG), and development of action plan approach, or any other innovative approach that could suit particular ecological area.

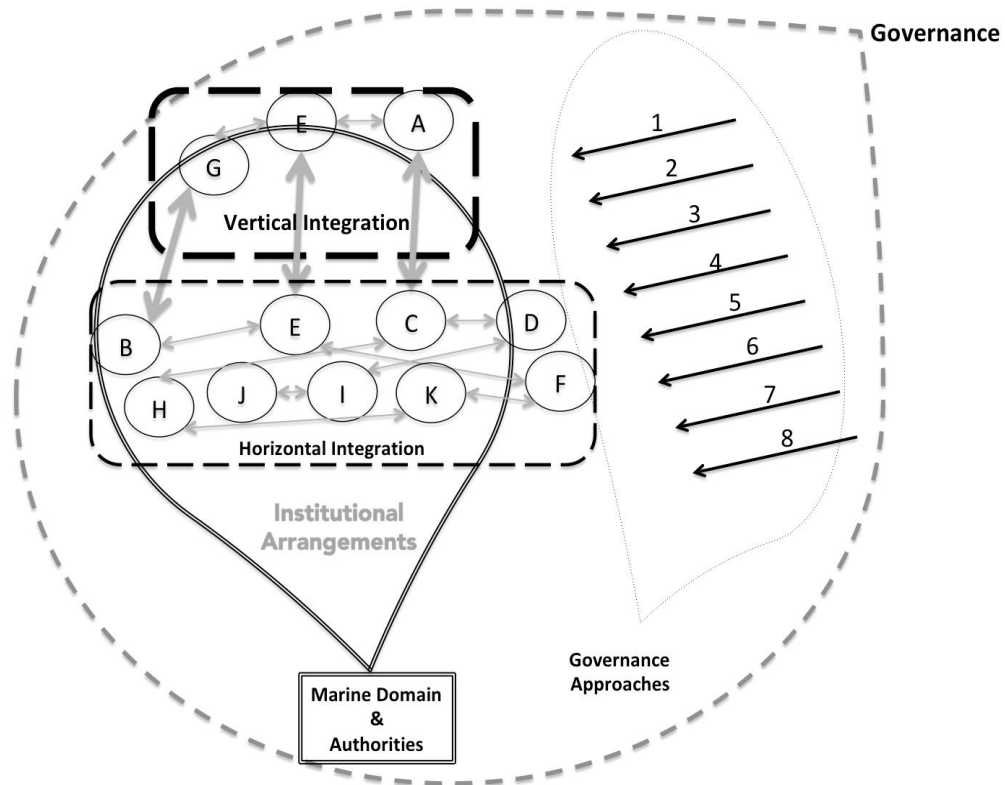


Figure 2.5 The governance is overarching, as it is the system that controls and directs entities, whereas GA (examples: 1,2,3,4,5,6,7,8) are the various approaches that can be selected to control the various governance entities (authorities) (examples: A,B,C,D,E,F,G,K) within and outside the marine domain, and institutional arrangements (grey arrows) are the ways that authorities are located horizontally and vertically and their relationship with each other.

2.3.2(a) Authority

Speaking of the authorities, the early discussions started decade a ago with [Ehler and Douvere \(2010\)](#) arguing that one of the most important characteristic of an effective MSP is a clear authority before the start, in addition to a powerful legislations established before starting the planning step, which could be from existing/ new legislations or administrative actions as in the case of USA. Likewise, [Peart \(2017\)](#) suggested the establishment of a governance entity with certain powers and

representatives from different sectors. Similarly, the incorporation of a framework of guidelines for MSP in the national legislation as well as the selection of a competent authority or enhancing it (if available) for its implementation must be considered (Liu et al., 2011; Tsilimigkas and Rempis, 2017). In addition in the process of transition management there should be an authority ready for that to perform and to accept the transition, and the process must encompass the four cyclical steps; establishment, visioning; steering process; and monitoring and evaluating the transition process (Kelly et al., 2018). Likewise, as argued by Hassler et al. (2018) there should be a need to “establish more specific transnational institutions that can target specific geographic or issue areas more effectively”.

Thus, a unique, designated authority could serve MSP better. But this should be accompanied with a clear institutional arrangement between the designated authority and all other authorities/departments that are having direct or indirect relation with the marine domain.

2.3.2(b) Institutional Arrangements

Some authors argued that an enhanced institutional arrangement could resolve issues with institutional ambiguities and a re-territorialisation (the restructuring of a place or territory that has experienced deterioration) (Kern and Söderström, 2018). However, that should be accompanied by a comprehensive understanding of all future events, the competition for ocean spaces, the implications of new technologies, and a better response to informed societal values (Johnson et al., 2019), adherence with institutional principles (principles of institutional integration and cooperation (Pyć, 2019). Nevertheless, Yatim et al. (2016, 2018) suggested that in a top-bottom approach development and validation of a framework of sustainable marine institutional directions is effective, and in a bottom-top approach the gyro should be turned toward the leading agency to collect the spatial information, to process and to distribute it to related agencies and stakeholders.

2.3.2(c) Governance Approaches (GA)

Speaking of governance, MSP is integral part for the governance of marine areas (Mengerink, 2010) and it is better not to refute MSP as a powerful governance tool (Smith and Brennan, 2012). Approximately 9% of the papers (n=22) addressed the importance of a GA to MSP.

While some of the approaches are tools for implementing a MSP, Douvere (2009) argued that MSP could be a useful tool in making ecosystem-based approaches a reality, and it is better to be considered during systematic review and the planning process of MSP (Foley et al., 2010). However, in examining the spatial dimensions of the ecosystem approach, Kern and Söderström (2018) found that the development, implementation, and spread of ecosystem approach should correspond with changing socio-spatial relations, as well as, and as argued by Smythe (2017) a social network analysis (SNA), which is a suite of methods for analysing relations between individuals and organizations. Moreover, Johnson et al. (2012) argued that there is a need for more research into the delegation of marine stewardship powers to local communities, and when involvement of local community is beyond national jurisdiction a differentiation between the regulations from institutions acting on behalf of the international community and bilateral conventions between neighboring countries should be respected.

Nevertheless, with the complexity of the socio-natural systems and the importance of inputs from stakeholders and the public for well-informed decision-making, it is recognised that MSP is rooted in the principles of good governance (participation and transparency). Thus, the focus is on institutional arrangements that allow stakeholders and the public to contribute to the planning of the seas and coasts. However, Smith (2018) argued that in order to overcome the challenges faced by planners, improvements can be made in terms of how and when engagement takes place. In addition, high-priority stakeholders should be identified, management procedures for