Extending the concept of institutional analysis to the marine spatial planning practice

M H M Yatim1*, A H Omar2, N M Abdullah3 and A Sarip4

1,2Faculty of Geoinformation & Real Estate, Universiti Teknologi Malaysia (UTM), 81310 Skudai, Johor, Malaysia
3Community College in Muar, 84000, Johor, Malaysia
4 Faculty of Management, Universiti Teknologi Malaysia (UTM), 81310 Skudai, Johor, Malaysia
hafizyatim3005@gmail.com

Abstract. Policy formation for the marine environment seems to be a central issue for the maritime nations in order to propose a strategic plan for marine spatial governance. The idea of forming a policy is about understanding the action principle among the institutions involved that guides towards an effective decision making process. The analysis that suits into the reformation of policies is the Institutional Analysis and Development Framework (IAD) that was proposed by Elinor Ostrom, the American political scientist focusing into the institutional behaviours. This paper strives to raise awareness of integrating the concept of Institutional Analysis and Development Framework into the effective practice of Marine Spatial Planning (MSP) in Malaysia. The integration of social science knowledge into the Ecosystem Based Management (EBM) cycles seems to show a growing number in the past decade and the results obtained are reviewed to ensure the suitability of integrating the idea of Institutional Analysis & Development (IAD) into the Malaysian MSP practice to predict institutional behaviour and relationship for the outcomes.

1. Introduction

Marine space planning seems to be the next agenda for most of the maritime nations in order to have a sustainable governance of the coastal environment. The increasing numbers of coastal activities is considered the cause of concern for governing the marine areas. Activities such as fisheries, transportation, mineral exploration, coastal settlements and flora fauna habitat conservation are just a few examples that highlight the need to effectively and sustainably govern the marine spaces [1–3]. Moreover, the variety of marine activities has however led to uncertain and overlapping roles among the institutions.

According to previous studies, the issues that are faced by the marine institutions to govern the marine spaces revolve around legal, technical and institutional issues [4,5]. This study is focused on the institutional issues regarding the effective marine space planning. The highlight of marine space planning or marine spatial planning is that it is fundamental to have sustainable marine spatial governance. Nevertheless, the institutional component represents the human behaviour and relationship that existed among the marine community. The community in marine space consists of government, non-government as well as the academic institutions that perform multiple different responsibilities and without a proper plan, it is impossible to manage all of them.
The need to manage the institution under one effective and sustainable plan is the concern in the marine spatial planning concept [6]. Many studies have focused towards the leading agency among the multiple institutions to collect the spatial information, to process and to distribute the data among the institutions as well as to the public. It is the central issue that needs to be resolved when the marine society starts to govern their marine spaces. The process of assigning the lead central agency has been best performed using the stakeholder analysis. Stakeholder analysis is the process of systematically classifying the institutions to determine the most influence among them. The analysis needs to answer three main questions; (i) Who should be involved? (ii) When they should be involved? and (iii) How they should be involved? [7]. The outputs from the analysis propose the hierarchy of the institutions based on the power and level of influence of the stakeholders. It is the initial step to identify the institutions that involve in governing marine spatial information; and the focus of this study is towards the next stage of the implementation.

The second step to be implied when the specific institutions were identified is to form the policy or the action principles to guide the decision making of the institutions [8]. Malaysia, at the current stage of implementing the working plan of governing the marine spaces still did not have policies or regulations [6,9] regarding the discussion matter and therefore, this study is proposing for effective plan policies for the working committee of the marine spatial plan. Hence, the analysis that suits the objective and be the centre of discussion in this study is the Institutional Analysis and Development (IAD). The adaptation of the idea of IAD into the planning process of marine spaces is opening the new paradigm of integrating the social science perspective into technical governance. This paper will discuss the integration of marine spatial planning practice in Semporna, Sabah towards the effectiveness of IAD framework as the key step to reform a marine policy in Malaysia.

2. Institutional Analysis and Development (IAD)
First and foremost, this paper will introduce about the analysis to study the institutional behaviour known as the Institutional Analysis and Development (IAD). The Institutional Analysis and Development is a set of evaluation concepts of analysing the social structure, positions and rules between the institutions [10–15]. The analysis which was introduced by Elinor Ostrom [13], the political scientist, is the best option to study and understand how the institutions operate and change upon implementation of certain projects. The understanding process involves the detailed exploration of the framework of IAD concept as shown in Figure 1.

![Figure 1. Framework of IAD [13–16]](image)

The framework of IAD can be divided into two parts which are the external variables; biophysical conditions, attributes of community and rules in use that represent the input of the research. In the middle of the framework is the action situation box that illustrates the main part of the analysis. The internal designs of action situations are shown in Figure 2. The action situation box consists of seven (7) components to be analysed which are the actors, positions, actions, informations, control, potential outcomes as well as net costs and benefits [15,17–21]. It is clear that actors’ positions is the priority and the actions assigned to the positions or committee assigned are linked towards the restrictions (control) and the information that are readily
offered by the institutions. All of the linkages will lead towards the potential outcomes and apart from that, the component of net costs and benefits are also being evaluated. The components assigned in the action situation box are defined by a set of rules that refer to the prescription enforcement about actions that are allowed and permitted. Seven (7) rules are introduced by Ostrom that externally affect each component in the action situation box as shown in Figure 3.

![Diagram of action situation box](image)

**Figure 2.** Internal design of action situations box [15]

| Rules          | Explanation                                                                 |
|----------------|-----------------------------------------------------------------------------|
| Position Rules | Set of positions or roles, which are held by different types of participants in an action situation. |
| Boundary Rules | Specify how the actors are chosen to enter or leave these positions, thus influencing the number, attributes, and resources of the participants. |
| Choice Rules   | Specify what actions assigned to an actor in a position are allowed, obliged, and prohibited. In this way, these rules directly determine responsibilities, rights, and freedom. |
| Aggregation Rules | Determine how decisions are made in an action situation. Specifies who will be involved in the choice and how much each actor’s decision could contribute to the transformation function from actions to intermediate or final outcomes. |
| Scope Rules    | Specify the potential outcomes that can be affected and, working backward, the actions linked to specific outcomes. |
| Information Rules | Specify what information is available to each position; these rules affect the channels of communication among the participants. |
| Payoff Rules   | Affect the benefits and costs that will be assigned to particular combinations of actions and outcomes, and they establish the incentives and deterrents for action. |

The seven rules will propose the potential outcome which is the interactions among the institutions (see Table 1). The outcome of the analysis is briefly focused on six aspects; (i) economic efficiency, (ii) fiscal equivalence, (iii) distributional equity, (iv) accountability, (v) sustainability, and (vi) conformance to values of local actors [15]. Eventually, the framework of IAD is basically to understand the connection that exists among the institutions in order to propose the outcomes [22,23],. On the other part, it is important to look back at the external variables issued by the framework to assure the main topic of the analysis. As mentioned earlier, the focus of the study is trying to solve the marine space planning issues that are being highlighted by most of the maritime nations. The next part
explains on the components that were identified to guarantee effectiveness of marine spatial planning practices.

![Diagram](image)

**Figure 3.** Rules defining the Action Situation Components [15]

3. **Marine Spatial Planning**

Managing the marine spaces and to have an effective and sustainable plan is the main issue among maritime nations. Governance of marine space starts from a good planning process and most importantly is the connection between the institutions involved. Marine spatial planning is not a one-time solution [24–28] proposed to sustainably govern the marine activities but it involves a number of steps to achieve one complete circle of practice and it needs alternatively multiple iterations to achieve sustainability of the plan.

By definition, marine spatial planning is a specific process to sustainably manage the georeference coordinate (x, y, and z) for each marine activity in order to clarify the boundary of responsibilities among the institutions [29–34]. The georeference coordinate location of the marine areas is known as the spatial information and the plan needs to be able to register the marine activities according to the areas mapped in the plan. Hence, before the plan was mapped, it is crucial to identify every leading institution together with their marine activities. The institutions that are reported by previous studies consist of government agencies, non-government organizations and academics worldwide. Additionally, the involvement of every institution is important especially at the earliest stage of implementation. Moreover, every institution needs to be included in the decision making process to create a mutual trust connection among the committee members. The process of gathering and educating the society about the implementation of the marine spatial plan is complicated. It is because the researcher needs to clarify the spatial information required by the agencies and the legislation assigned by each institution in order to come out with a sustainable policy. Through the practice, an integrated and sustainable plan can be achieved.

In order to achieve a sustainable plan, the marine spatial plan needs to undergo a number of iteration cycles. In previous studies, the complete cycle of marine spatial planning consists of four main stages which are; (i) Planning, (ii) Plan Evaluation, (iii) Implementation; and (iv) Post Implementation (Review of the plan). It seems that from one study to another according to latest publications, the stages of MSP practice are being detailed and it is reflected from the iteration cycle experienced by the country. As mentioned earlier, institutions involvement at the earliest stage of plan development is crucial to acquire as much ideas as possible to guarantee a sustainable plan.

Furthermore, to attain a sustainable plan, the planning and governing of the plans need to be effective. Effectiveness is measured from the institution actions towards the achievement of planned objectives. Therefore, it is concluded that the objectives are important to lead the direction of the plan.
It seems that the effective criteria are used as the components that are tested in the external variable boxes of the IAD framework. In order to achieve and effectively plan the marine space planning, there are five components which are; (i) territorial-marine coordination, (ii) institutions involvement, (iii) evidence and uncertainty, (iv) capacity learning, awareness, and (v) leadership and communication. These five components are placed in the external variable box for the framework and tested for the action situation to propose a strategic institutional behaviour towards an effective MSP practice. The integration of effectiveness components of MSP practice into the IAD framework is shown in Figure 4.

![Figure 4. Integration of Effective Components of MSP Practice into IAD Framework](image)

4. Case Study
The acceptance of implementing the concept of marine spatial planning in Malaysia seems to be the beginning of priority being given to effectively govern the maritime areas. Malaysia as a maritime nation is a country with total line-up of 4,675 kilometres coastline that covered 574,000 square kilometres (km$^2$) surrounded by sea and 95 percent of the economic activities are conducted through the ocean [31].

Among the other states, the state of Sabah has been the pioneer into the implementation of Malaysia Marine Spatial Planning (MMSP) with the pilot area of Semporna district [37]. Semporna has been one of the main attractions of Sabah among tourists who are into diving, snorkelling and island hoping activities in Bohey Dulang, Sipadan, Kapalai and Mabul Island [32,33]. Hence, it is the initiative of the State Government of Sabah to introduce the marine spatial plan of Semporna which is known as Semporna Marine Spatial Planning (SMSP) [34] initiated back from the year 2014. Currently, the Semporna MSP is at the planning phase and the implementation is considered to be the benchmark for Malaysia to sustainably govern their marine spaces.

The SMSP project was initially conducted by Town and Regional Planning Department of Sabah (TRPD) and WWF-Malaysia. It has been a tremendous achievement as the proposed plan has received the prestigious International Award for Planning of Excellence Award from the Royal Town Planning Institute (RTPI), United Kingdom back in 2016. It is shown that Semporna Marine Spatial Plan has been in the right track towards the implementation of the project.

Regarding the need of the IAD framework action-situation package, the first requirement is the identification of the institutions involved and the positions regarding the committee in Semporna MSP. From the documentations and interviews with the main leading institutions of the project, WWF-Malaysia and TRPD, the committee of institutions in SMSP is shown in Figure 5.
Figure 5. Working Committee of Semporna Marine Spatial Planning

From Figure 5, the Implementer Committee is the central group which has been highlighted to study the effectiveness of the MSP practices, especially in Malaysia. As for the implementer committee that is responsible to produce a working plan of the project, the effectiveness study is vital as well as the institutional behaviour to produce a sustainable policy of marine spatial planning. Further studies on the other rules of IAD affecting the effectiveness practice of marine spatial planning should be continued to complete the whole framework of IAD towards effective MSP practices in Malaysia.

## 5. Conclusion

The integration of the IAD framework within the effectiveness of marine spatial planning practice seems to be the next big agenda for the maritime nation to propose an effective policy study for marine space governance. Since, planning in marine environment is never a single process especially in order to achieve a sustainable solution of marine planning but it usually involve numbers of iterations cycle to create a dynamic and sustainable result. Moreover, each of the committee members involved in the Semporna MSP team holds great responsibilities and roles to develop the marine plan that is suitable to every institution related to the marine activities in Sabah, Malaysia. Adapting the concept of marine spatial planning in marine space governance is the initiative to effectively govern the marine spaces due to the overlapping roles and responsibilities of the marine institutions. Hence, governing the marine spaces without a proper plan is causing the conflict of claiming the area-based activities as there are redundancies of the activities between the institutions. So, MSP is the proposed solution to the problems. The effective components of marine spatial planning according to previous studies highlight five components; stakeholder involvement, evidence & uncertainty, capacity, learning & awareness, leadership & communication and land-sea coordination.

Over a century ago, the study on MSP practice is developing among academic scholars on every aspect and it is recommended that further studies to integrate the MSP practice with the IAD concept to prepare the marine policy for Malaysia maritime governance committee. Furthermore, IAD is known as the analysis to evaluate the institutional behaviour of the specific practice and the emergence
of the MSP idea is the perfect combination to produce the organizational behaviour among the marine institutions towards the effectiveness of MSP practices. The case study in Semporna, Sabah that implements Semporna MSP had witnessed the formation of three main committees; Steering Committee, Technical Committee and Implementer Committee as the start to answer one out of seven rules applied in the IAD framework, which is the position rules.

As for conclusion, the study of effectiveness on marine planning practices is the focus for maritime nations as well as the integration of IAD analysis, which is proposing the new perspective of development of marine policies especially among the marine institutions.

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