SWOT-AHP Combined Model Analysis of the Factors Affecting Sustainable Development of Dar es Salaam Seaport in Tanzania

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Abstract— Seaport development sustainability is among of crucial challenges to seaport authorities all over the world, this challenge requires the discovering of new methods for operating and controlling their seaport. Development sustainability is not limited to social and economical aspects, it extended to environmental development as well. Increasing environmental consciousness poses new challenges to seaport developments, future development and operations of the seaports should be planned and controlled in proper ways. Dar es Salaam seaport is situated in Tanzania, Dar es Salaam seaport tries to attain its sustainable development but there are some factors which are internally and externally affecting it. In connection to this, previous researchers have not provided a clear explanation on sustainable development of seaport. Moreover, most of their studies focused on the impact associated with the development of seaport and ignored about what factors affecting sustainable development of seaport. All factors that affecting the sustainable development of Dar es Salaam seaport in Tanzania are analyzed in this study using SWOT-AHP combined model. A comprehensive review of prior works has been conducted, also primary data have been collected through questionnaires, Delphi method and interview with the representatives of seaport authority and representatives from purposively selected seaport stakeholders. Findings and analysis from this study helped to identify key factors and the priorities for sustainable seaport development from both seaport authority and other stakeholder's viewpoints. The results found show that Dar es Salaam seaport possesses more strengths compared to weaknesses also possesses more opportunities compared to threats. Mini-Maxi development strategy seems to be effective based on study findings, hence it is recommended to be applied for the sustainable development of Dar es Salaam seaport. This paper will be useful to Tanzania Port Authorities (TPA) and other authorities in Tanzania might be used as a benchmark for deciding future sustainable development plans for Dar es Salaam seaport.

Keywords— Analytical Hierarch Process, Dar es Salaam seaport, Development strategy, Sustainable development, SWOT analysis.

I. INTRODUCTION

Ships are using seaports for the import and export of countries' products. Economic growth of the countries depends on the level of import and export according to economics perspectives. Hence when more ships are accommodated in a seaport means it increases the level of export and import which implies the growth in countries' economy. Maritime transport is the main carrier and driver of trade in the world, which takes place by maritime transport routes and connects large industrial, traffic and trade hubs with their seaports [1]. Seaport possesses an important potential for various economic and social development projects. Seaport sustainable development is simply described as the capability of a seaport to attain its economical and social targets without impacting its own future, but professional thoughts should be considered when seaports are trying to implement a sustainable development plan [2]. Seaport development sustainability is among of crucial challenges to seaport authorities all over the world, development sustainability is not limited to social and economical aspects, it extended to environmental development as well. Increasing environmental consciousness poses new challenges to seaport developments. When developing a seaport special attention should be given to diminishing environmental costs, resources and waste management, and pollution prevention so as to improve sustainable development and competitiveness of a seaport [3]. Seaports should arrange and control their operations and potential expansions (development) in a sustainable manner so as to deal effectively with restricted or reduced environmental areas and to improve its hinterlands' connections. The identification and adaptation of the idea for seaport development in synchronization with the surrounding cities is visibly provide a green growth and significant economic driver [4]. Dar es Salaam seaport fulfils a vital role in social and economic development of Tanzania. For the objective of satisfying the increased demand for oversee products from its hinterland residents, recently seaport authority together with responsible authorities in Tanzania have decided to attain sustainable development for Dar es Salam seaport. Although, like other seaports in the East African region, there are some factors within and from outside the seaport (internal and external) affecting its sustainable development [5].

This is the first article to provide full analysis concerning internal and external factors that affecting sustainable development of Dar es Salaam seaport. This analysis is very vital for the Tanzania Port Authorities (TPA) as it will assist in their superior plans for the sustainable development of Dar es Salaam seaport. SWOT and the Analytic Hierarchy Process (AHP) techniques have been recognised by numerous researchers to be applied in assessing seaport development in the globe. Definitely, SWOT has been applied by many professions and marketing experts, also it is a well-liked

technique for the selection of business and marketing strategy [6]. The Analytic Hierarchy process (AHP) provides priority vector results, hence it is necessary to apply it because it gives the decision markers an insight for the best options [7]. Also factors for the sustainable development of a particular seaport can easily be recognised when the development of particular seaport will be compared with a well-developed seaport around the world. The SWOT-AHP combined model is used in this article in providing full analysis concerning the existing internal and external factors that affecting sustainable development of Dar es Salaam seaport in Tanzania.

II. LITERATURE REVIEW

2.1 Seaport Development Sustainability

Continent of Africa is considered to have more opportunities for investments. Concerning investment plans in Africa, seaports have a significant role, because seaports facilitate the entry and exit of the country's products or raw materials to be used for investment purposes. Therefore sustainable development of seaports is very important for the nations they belong to. Consequently, subject matter related to sustainable development of seaport recently attracted many researcher's attentions and interest hence resulted to numerous of scholars to write on the similar theme. Development sustainability turned into significant for seaports, like other institution's seaport executed essential task of incorporating its operations as well as its supply chains tailored to the environment and business requirements, in which the sustainability perception is of growing significance [8]. As described by the principle of triple bottom line (TBL), seaport sustainability including three main aspects [9]: The economic aspect entails efficiency on the utilization of seaport area, stipulation of seaport facilities for companies and returns on seaport investments. The social aspect entails direct and indirect provision of employment opportunities, liveability of areas in the surrounding area of the seaports, the contribution to education and knowledge and interrelationships between seaports and cities. The environmental aspect entails stipulation of management facilities for noise pollution, air quality, safety, disposal and dredging activities. even though development and seaport operations support both social and economic growth, but they have unfavourable outcomes on the environment, resulting to worsening the quality of water, air, and soil in the surrounding area of the seaport, also noise pollution become a common known case [10].

Several studies have been conducted around the globe for the aim of evaluating sustainable development of their seaports. Hannah et al., (2018) in their study adopted the importance-performance analysis method to recognize essential criteria for evaluating sustainability of South Korean seaports. Their findings considered that the most important measure is economic aspects related with provision of employment opportunities, thereafter followed by social and environmental issues. Also they provided valuable insights for seaport managers to recognize seaport sustainability matters so as to determine vicinity for developments and employ their resources to the suitable vicinity so as to improve

competitiveness of their seaport [11]. Saeyeon ROH et al, (2016), they addressed various challenges and opportunities towards sustainable development of ASEAN ports taking Vietnamese ports as a case study. They conducted a comprehensive review together with in-depth interview with port authorities so as to attain the study objective [3]. Izabela Kotowska (2016), he wrote an article concerning applicable policies to be used by seaport authorities to enhance sustainable development of seaport cities. In his study he described the responsibilities of seaport authority in ensuring the sustainable development of transportation through removing all transportation barriers [12]. Ahmed Mohamed Ezzat, (2016), he wrote a comparative study with a lot of suggestions recommended for the project of the Suez canal based on seaport cities sustainable development through the circular economy. His study focused on the way to attain seaport cities sustainable development through the application of the circular economy model. His findings disclosed key challenges and suggested strategies for corridor project of the Suez Canal [2]. Vijay Hiranandani, (2014). He conducted a multi-case study on seaport development sustainability. He used a qualitative approach to compare seaport practices and sustainable policies of seaports in different areas so as to understand opportunities, challenges and dilemmas which seaports are facing in attaining sustainable development [13]. C.A. Schippera et al. (2017), they conducted comparison study on achievements between seaports and seaport cities by considering their plans through sustainability assessment. They aimed to find out sustainability and efficiency of each seaport plan in comparison to others. Both quantitative and qualitative techniques were employed and comprehensive findings showed that there is a need to interlink green seaport policies via economic, social, and environmental aspects so as to understand the most potential and strengthen seaport operations so as to achieve sustainable development. In connection to this, the majority of previous researchers have not provided a clear explanation on sustainable development of seaport [14].

Moreover, most of their studies focused on the impact associated with the development of seaport and ignored about what factors affecting sustainable development of seaport. For this reason, there is a need to conduct this study so as to identify and analyse all key factors which affecting the sustainable development of seaports, particularly Dar es Salaam seaport in Tanzania.

2.2 Applications of SWOT and AHP Models

In addressing various problems, various researchers have applied either the AHP technique or SWOT technique. Also few of them have applied both models as it described in the article of Dijana Oreski, (2012), he combined SWOT and AHP techniques in developing strategy for the tourism planning of small cities in North West of Croatia. Tourism experts prioritized identified external and internal factors by using AHP. The precedence SWOT factors were employed to generate TOWS matrix. Findings found that isolation and proactive communication with efficient marketing strategies are the best to be applied [15].

Vasantha W and Shin-ei T (2009), they mixed SWOT and AHP models for renewal of strategic marketing planning for tourism in Sri Lanka. They examined external and internal factors of tourism sector. The precedence SWOT factors were employed to generate renewal TOWS matrix. They found that isolation and proactive communication with efficient marketing strategies are the best to be applied for thriving tourism renewal process [16]. Baiq Fitria et al., (2017) they used cross sectional approach in conjunction with intensive interviews with stakeholders to analyse the external and internal factors hindering the iron supplementation program in the Tasikmalaya district. Findings showed that Internal Factor Evaluation was 2.14 and External Factor Evaluation was 2.10. This demonstrating that, internally the program does not avoid weaknesses and does not optimize strengths, also signifying that externally, the program does not avoid threats and does not optimize the opportunities [17]. Rashidinejad F. and Bahareh A. (2012) in their article they combined SWOT and AHP techniques, to generate a rapid overview of the strategic situation of copper industry in Iran. It found that actions should be engaged to control the present status of production and potential development by make use of the benefits of strengths, converting possible threats to opportunities, and uplifting weaknesses [18]. W. Li and Y. Zuo (2017) they applied SWOT and AHP hybrid technique to analyse external and internal factors affecting budget management of the both small and large sized enterprises. They concluded that, the combination of SWOT and AHP can put strategic management of the budget in both enterprises [19]. Sayyid A. B. and Zahra R. (2016) combined SWOT and AHP techniques to rank internal and external factors affecting the environment of Iranian universities. They recommended that Iranian universities should utilize more its present opportunities and depending more on its internal control [20]. Bahadır Ç. B. and Ü. Tutku (2016) they employed a combined method which includes SWOT and (AHP) models, they tried to recognize the state of the forest products in Taşköprü. They found that, a significant section for Kastamonu's forest products is Taşköprü [21].

All previous researcher who employed the SWOT-AHP combined models as mentioned above they agreed that the combination between SWOT and AHP models assist to prioritize the SWOT clusters and sub-factors so as to decide accurately which factors are fit in to the SWOT and firstly to be considered. The SWOT-AHP combined model is also used in this article to provide full analysis concerning the existing internal and external factors that affecting sustainable development of African seaports particularly Dar es Salaam seaport in Tanzania.

III. METHODOLOGY

3.1 Model Development

This section describes the SWOT-AHP combined method. Initially, it exposes the necessity of combining these two techniques, followed by a separate review of SWOT and AHP techniques as applied in this article.

When AHP or SWOT method is applied separately in quantitative analysis some limitations were observed which can be corrected by combining both methods. SWOT-AHP combined method creates quantitative figures for SWOT factors [22]. Most of previously researcher who used Combined SWOT-AHP model proved that among of the necessities of SWOT-AHP are efficiency, simplicity and ability of combining both qualitative and quantitative criteria's [23]. The SWOT-AHP combined method is appropriate for countless circumstances of strategic planning. The new strategy for the development or strategic planning can be developed after identifying the priorities of SWOT factors. Additionally, it allows comparison among strategic alternatives, so to determine which one is matched the best with the SWOT factors. The use of SWOT-AHP combined method improves and increases knowledge base for performing strategic planning, this offers an important platform for learning. In certain cases SWOT-AHP combined method is used as education and communication instrument for decision making environment where by several decision-makers are participated [24].

M. Kurttila, et al., (2000) described that, in applying a combined SWOT-AHP model the following four steps should be followed accordingly; step one involving SWOT analysis, in which external and internal factors which are not exceed 10 in each SWOT group are identified, followed by second step of SWOT factor comparison with each SWOT group order to identify factors with higher impact regarding its strength, opportunity, weakness and threat. Third step is comparison of pairs among four groups of SWOT, here the chosen representative factor from every group is the one with highest local priority. The final step is the formulation of strategies using the obtained results from previous steps and the whole evaluation process. The most important factors are considered in defining the appropriate strategies [25].

3.1.1 SWOT analysis

SWOT is a short form in which the first two letters SW means strength and weakness which are directly related with internal institution factors, also these factors are probable under control of the institution. While the last two letters OT means opportunities and threats are directly related with the external institution environment factors [26]. SWOT is among of the well-known technique applied by planners in deciding the best strategies to be adopted for the success of the organization [27]. The application of SWOT analysis started in early 1960 up to date. SWOT is applied in many circumstances, such as for development and planning, also used as an instrument for systematize and interpreting information.

The SWOT method is uncomplicated and useful for systematizing information particularly at the beginning of research, but also it is more useful in theoretical and applied studies [28]. SWOT has confirmed to be extremely useful in identifying the institutional and environmental factors (internal and external factors) which are mostly important for strategic planning and institutional development. Also SWOT possessing some limitations such as inability to compute the weight effect and strategic factors on substitutes [22]. Chang et al., (2006) affirmed that relevance and effectiveness are

considered in ranking internal factors while the likelihood of potentials and attractiveness are used to categorize external factors [29]. All internal and external strategic factors are presented in SWOT matrix as shown in Table 1 below

Table 1. SWOT Analysis Matrix

Strength   Weaknesses

Strength	Weaknesses
How the institution will utilize its strengths to get the benefit of its opportunities?	How the institution will conquer its weaknesses that avert it from gaining the benefit of its opportunities?
Opportunities	**Threats**
How the institution will utilize its strengths to diminish the impact of threats?	How the institution will utilize its strengths to diminish the impact of threats?

Opportunities   Threats

Source: Authors (2020)

3.1.2 AHP Method

AHP Technique is the well-known tool founded since 1970 by Thomas Saaty for assisting in decision-making, the evaluation factors considered in decision making are clustered into sets and multiple levels after layering. Generally AHP technique goes through the following procedures; conceptualization of evaluation target projects (conceptualizing), establishment of evaluation criteria and hierarchical structure (structuring), evaluation criteria weight measurement (weighting), alternative trunk preference measurement (scoring), comprehensive score calculation (synthesizing), reflux process (feedback) and finally comprehensive judgment and policy suggestions deduction (concluding) [30].

The AHP is applied in this study to find out the weight of all factors. As the article's aim is to analyse factors affecting the sustainable development of Dar es Salaam seaport, it is initially important to identify a hierarchy, thus Strengths, Weaknesses, Opportunities and Threats of Dar es salaam seaport are the criteria layers, and the identified key factors will be considered in the project hierarchy. Thereafter, constructing a judgment matrix, judgement matrix contains results after factors being analysed and judged their significance with others. The numerical scale between 1 and 9 is used by experts to measure and give scores to the relative significance among two criteria as shown in Table below. Scaling is a comparison of factor i to factor j by calculating their relative significance and the approximated value obtained is indicated as aij. The aij values are shown in Table below. If the major aim of aij is to identify the disparity among the weight i and the weight j, also the disparity among the factor i and factor j, the Wi / Wj ratio will be given. Therefore, Judgment matrix A represent the pairwise comparison of n goals in the decision-making process, as presented below:

$$A = \begin{bmatrix} a_{11} & \dots & a_{1n} \\ \dots & \dots & \dots \\ a_{n1} & \dots & a_{nn} \end{bmatrix} = \begin{bmatrix} w_1/w_1 & \dots & w_1/w_n \\ \dots & \dots & \dots \\ w_n/w_1 & \dots & w_n/w_n \end{bmatrix} \quad (1)$$

Table 3.1 Judgment Matrix Scale of Relative Significance

Value of a$_{ij}$	Definition	Description
1	Equal significant	Factors i and j are of equal significance in comparison
3	Slight significant	Factor i is of slight significance comparing to factor j
5	More significant	Factor i is of more significance comparing to factor j
7	Of great significant	Factor i is of great significance comparing to factor j
9	Extremely significant	Factor i is of extremely significance comparing to factor j
2,4,6,8	-	In-between value of the above
Reciprocal		Once factor i gives a$_{ij}$ when compared to factor j, therefore the judgement of factor j compared to factor i will be equal to 1/ a$_{ij}$.

Table 3.1 above provides a tangible thought on the judgment table which used by experts in giving accurate relative significance scale for this study. Thirdly, as regards the rating of judgment matrices, in the AHP a single judgment matrix is used to measure the value of the weight between the variables in relation to their requirements. Once the matrix A is obtained by decision markers by pair wise contrast, the value of the weight vector will be determined by the matrix. There are so many popular weight vector computing methods like the characteristic root method, the root method, the sum method, the row geometric mean prioritization method (RGPM) which is also known as logarithmic least square method and the least square method [31]. Moreover the RGPM characterized with less computational time thus why selected to be applied in this study for the weight vector computations, thus:

$$W_i = \frac{\sqrt[n]{\prod_{j=n}^{n} a_{ij}}}{\sum_{i=1}^{n} \sqrt[n]{\prod_{j=n}^{n} a_{ij}}}, i \in \{1, 2, ..., n\} \quad (2)$$

3.2 Sample and Data Collections

Table 3.2 SWOT Matrix of the Dar es Salaam Seaport Factors Evaluation

Internal Factors	External Factors
Strengths: B1	**Opportunity: B3**
Promote Container throughput volume growth: C1	Global growth of container shipping business: E1
Geographical location: C2	Natural resources available in hinterland regions: E2
Large coverage of hinterland regions: C3	Constant economic growth of hinterland regions: E3
High annual revenue: C4	Big size of hinterland market: E4
Benefit of financial support of Tanzania government and private investors: C5	Constant trade volume increase between Tanzania and other foreign countries: E5
Weaknesses: B2	**Threats: B4**
Seaport congestion: D1	Competition from neighbour seaports namely Mombasa and Djibouti: F1
Lack of maritime professionals: D2	Absence of Tanzania Maritime Authority: F2
High seaport cost: D3	Poor seaport hinterland connectivity: F3
Lack of modern information and communication technology: D4	Environment barriers to seaport development: F4
In adequate seaport management model: D5	Low level of maritime education in Tanzania: F5

Source: Delphi and Interview methods, 2020

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Table 3.2 above present the SWOT strategic factors which were obtained through the Delphi method and interview conducted with experts and academicians such as doctorate and professors from three colleges in Tanzania namely Dar es Salaam Maritime Institute (DMI), National Institute of Transport (NIT) and Bandari College, also some representatives from various institution such as the Ministry of Finance in Tanzania, Tanzania Port Authorities (TPA), Tanzania Revenue Authority (TRA), the Ministry of Work, Transport and Communication, Tanzania Shipping Agent Corporation (TASAC), private companies which are operating in Dar es Salaam seaport and some regular seaport clients,. A well structured questionnaire along with its covering letter explaining the objective of the study were sent to purposively selected respondents from organizations as mentioned above using e-mail. Phone calls were used to remainder the response from non respondents after every two weeks. From the one hundred and forty questionnaires which were sent only one hundred and ten questionnaires collected back with proper response. This showing that positive response was about 79% of the total contacted persons. The main five factors from Strengths, Weaknesses, Opportunity and Threats are noticed to affect the sustainable development of Dar es Salaam seaport in Tanzania. In order to get valid data and controlling the bias issues, questionnaires abided guidelines during the formation process such as assuring secrecy to respondents, well-structured partition of measured stuff and getting measures from various sources [32].

IV. RESULTS ANALYSIS AND DISCUSSION

Subsequent to the identification of all key factors (internal and external) that affecting the sustainable development of Dar es Salaam seaport in Tanzania by using Delphi, interview and questionnaires which completed by the specified experts, a new questionnaires were used to compare the pairs among the identified factors, the second round questionnaire were sent to only experts who responded positively in the previous questionnaires. In this stage, the AHP was applied. Also the experts were inquired to provide a rank to every factor. Table 4.1 to table 4.10 below shows the results of pair-wise compared matrices between the SWOT clusters.

Table 4.1 Internal Judgment Matrix

A	B1	B2	W
B1	1	2	0.67
B2	1/2	1	0.33

Source: Analysis Results, 2020

Table 4.2 Strength Weight Judgment Matrix

B1	C1	C2	C3	C4	C5	W
C1	1	3	1/2	6	4	0.30
C2	1/3	1	1/5	4	3	0.14
C3	2	5	1	7	3	0.43
C4	1/6	1/4	1/7	1	2	0.06
C5	1/4	1/3	1/3	1/2	1	0.07

Source: Analysis Results, 2020

The big factor (B1 and B2) was multiplied by the found weight of each small factor above so as to get vectors scores for internal factors that affecting the sustainable development

of Dar es Salaam seaport in Tanzania.

Table 4.3 Weaknesses Weight Judgment Matrix

B2	D1	D2	D3	D4	D5	W
D1	1	2	1/3	6	3	0.24
D2	1/2	1	1/7	1/4	7	0.10
D3	3	7	1	5	3	0.49
D4	1/6	4	1/5	1	2	0.11
D5	1/3	1/7	1/3	1/2	1	0.06

Source: Analysis Results, 2020

Table 4.4 Vector Scores for Internal Factors

Internal Factor	Weight
C1	0.2
C2	0.09
C3	0.29
C4	0.04
C5	0.05
D1	0.08
D2	0.03
D3	0.16
D4	0.04
D5	0.02

Source: Analysis Results, 2020

Table 4.4 above confirms that regarding to the strengths factors, the factor C3 which is large coverage of hinterland regions is the most significant strength of Dar es Salaam seaport as it scored the biggest weight, subsequently by the factor C1 which is promote container throughput volume growth, the factor C2 which is geographical location, then factor C5 which is the benefit of financial support of Tanzania government and private investors and the finally strength is factor C4 which is high annual revenue. While about the Weaknesses factors, the factor D3 which is high seaport cost seems to be the biggest weakness of Dar es Salaam seaport, followed by the factor D1 which is seaport congestion, the factor D4 which is lack of modern information and communication technology, the factor D2 which is lack of maritime professionals and the factor D5 which is inadequate seaport management model.

Table 4.5 External Judgment Matrix

A	B3	B4	W
B3	1	2	0.67
B4	1/2	1	0.33

Source: Analysis Results, 2020

Table 4.6 Opportunities Weight Judgment Matrix

B3	E1	E2	E3	E4	E5	W
E1	1	1/7	1/2	1/6	4	0.08
E2	7	1	5	4	5	0.52
E3	2	1/5	1	1/2	3	0.12
E4	6	1/4	2	1	4	0.23
E5	1/4	1/5	1/3	1/4	1	0.05

Source: Analysis Results, 2020

Table 4.7 Threats Weight Judgment Matrix

B4	F1	F2	F3	F4	F5	W
F1	1	9	7	5	3	0.60
F2	1/9	1	5	1/5	5	0.13
F3	1/7	1/5	1	1/3	3	0.07
F4	1/5	5	3	1	7	0.15
F5	1/3	1/5	1/3	1/7	1	0.05

Source: Analysis Results, 2020

The big factor (B3 and B4) was multiplied by the found weight of each small factor above so as to get vectors scores for external factors that affecting the sustainable development of Dar es Salaam seaport in Tanzania.

Table 4.8 Vector Scores for External Factors

External Factor	Weight
E1	0.05
E2	0.35
E3	0.08
E4	0.15
E5	0.03
F1	0.20
F2	0.04
F3	0.03
F4	0.05
F5	0.02

Source: Analysis Results, 2020

Table 4.8 above, reveals that regarding to opportunities factors, the factor E2 which is natural resources available in hinterland regions is the biggest opportunity that Dar es Salaam seaport has, as it scored the largest weight, subsequently by the factor E4 which is big size of hinterland market, the factor E3 which is constant economic growth of hinterland regions, the factor E1 which is global growth of container shipping business and the last is factor E5 which is constant trade volume increase between Tanzania and other foreign countries. About Threats factors, the factor F1 which is competition from neighbour seaports namely Mombasa and Djibouti is the greatest threat threatening the sustainable development of Dar es Salaam seaport, followed by the factor F4 which is environment barriers to seaport development, the factor F2 which is absence of Tanzania Maritime Authority, the factor F3 which is poor seaport hinterland connectivity and the factor with lowest weight is factor F5 which is low level of maritime education in Tanzania.

Table 4.9 IFE Matrix

Internal Factors	Rating	Weight	Score
Strengths			
C1. Promote Container throughput volume growth	4	0.2	0.8
C2. Geographical location	2	0.09	0.18
C3. Large coverage of hinterland regions	2	0.29	0.58
C4. High annual revenue	4	0.04	0.16
C5. Benefit of financial support of Tanzania government and private investors	2	0.05	0.1
Weaknesses			
D1. Seaport congestion	3	0.08	0.24
D2. Lack of maritime professionals	1	0.03	0.03
D3. High seaport cost	4	0.16	0.64
D4. Lack of modern information and communication technology	2	0.04	0.08
D5. In adequate seaport management model	2	0.02	0.04
Total		1.00	2.85

Source: Analysis Results, 2020

In evaluating internal and external factors that affecting the sustainable development of Dar es Salaam seaport (IFE and EFE Matrices), vectors scored weight was multiplied by the

ranks given by the experts for each internal and external factor. Likert scale was from 1 to 4 where by ranking scale 1 indicates that the response is not good, 2 indicate that the response is below average, 3 indicates that the response is above average and superior response is indicated by 4. The total rating ranks provided by experts was summed up and then average rating rank for each factor was found according to the number of experts.

Table 4.10 EFE Matrix

External Factors	Rating	Weight	Score
Opportunities			
E1. Global growth of container shipping business	4	0.05	0.2
E2. Natural resources available in hinterland regions	2	0.35	0.7
E3. Constant economic growth of hinterland regions	4	0.08	0.32
E4. Big size of hinterland market	2	0.15	0.3
E5. Constant trade volume increase between Tanzania and other foreign countries	2	0.03	0.06
Threats			
F1. Competition from neighbour seaports namely Mombasa and Djibouti	3	0.20	0.6
F2. Absence of Tanzania Maritime Authority	3	0.04	0.12
F3. Poor seaport hinterland connectivity	1	0.03	0.03
F4. Environment barriers to seaport development	3	0.05	0.15
F5. Low level of maritime education in Tanzania	4	0.02	0.08
Total		1.00	2.56

Source: Analysis Results, 2020

Values range for internal and external factor evaluation (IFE and EFE) is between 1.0 - 4.0, and an average is 2.5. The value below 2.5 signifies weak position of the institution while the value above 2.5 signified the strong position of the institution. As shown in Table 4.9 above, the Internal Factor Evaluation (IFE) obtained is 2.85 which means Dar es Salaam seaport internally is in a strong position. The highest score value for an institution is 4.0 which signifying that the institute reacts very well to opportunities and threats. Based on the result presented in Table 4.10 above, the External Factor Evaluation (EFE) obtained is 2.56, which means Dar es Salaam seaport has brilliant opportunities which could assist to evade its threats.

V. SUGGESTED STRATEGY

Regarding to the found results from IFE and EFE by the application of a combined SWOT-AHP model, now it is easy to select a development strategy which is suitable for the sustainable development of Dar es Salaam seaport in Tanzania out of four suggested kinds of development strategies by the SWOT matrix. Definitely, SWOT matrix is applied for the selection of a strategy that an institution should apply in order to get sustainable development according to the results obtained by the SWOT analysis of that institution. Mainly there are four kinds of development strategies specifically SO,

WO, ST and WT. The synchronization among internal and external factors creating a development strategy to be adopted [33].
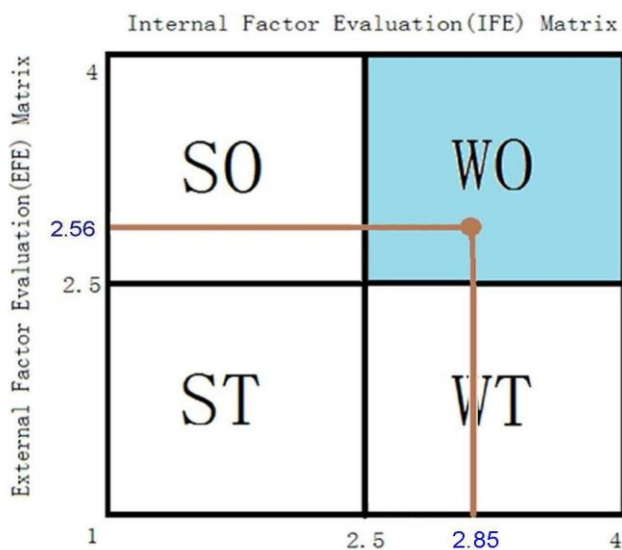

Figure 5.1. Development strategy based on IFE and EFE matrix results
Source: Author Analyisis (2020)

VI. CONCLUSION

All key factors that affecting the sustainable development of Dar es Salaam seaport in Tanzania internally and externally are clearly analysed based on SWOT-AHP combined method. It observed that the large coverage of hinterland regions is the most significant strength of Dar es Salaam seaport and high seaport cost seems to be the biggest weakness of Dar es Salaam seaport. While natural resources available in hinterland regions is the biggest opportunity of Dar es Salaam seaport and competition from neighbour seaports namely Mombasa and Djibouti is the biggest threat of Dar es Salaam seaport. Also IFE and EFE results analysis decided on the selection of the best developing strategy suitable for the sustainable development of Dar es Salaam seaport in Tanzania. The decided development strategy is WO (min-max strategy) Dar es Salaam seaport is required to utilize effectively its opportunities so as to minimize its weaknesses. By applying this strategy Dar es Salaam seaport is expected to become the busiest and leading seaport in the African continent in terms of efficiency and competitiveness, also will contributing extremely to the economic growth of Tanzania.
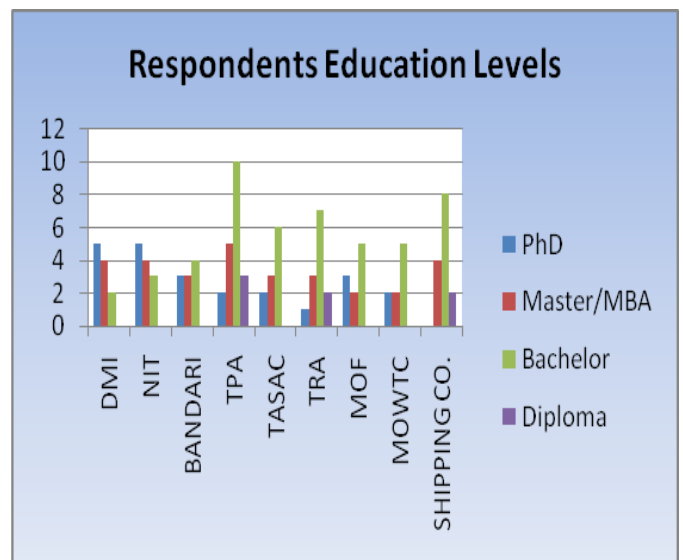
Education Levels of Interview and Questionnaire Respondents
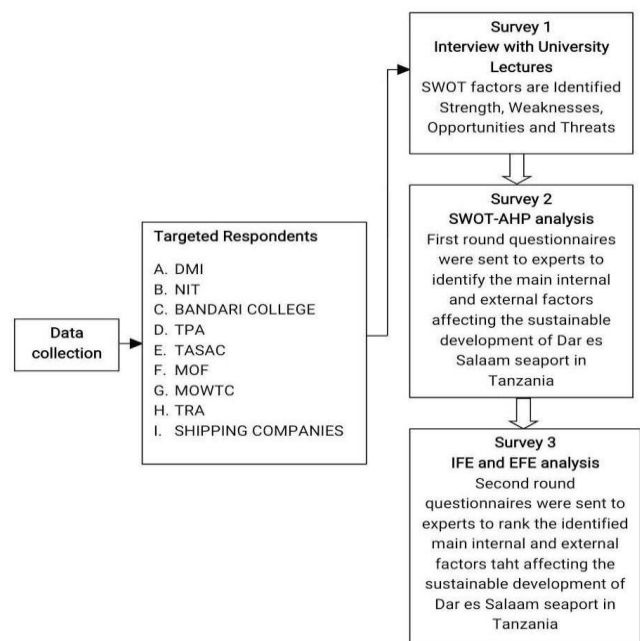
Framework and implementation of data collection process of this study

REFERENCES

[1] Lloyds List, "Future of shipping: Why CO2 is changing the world and shipping with it", London, (2009).

[2] Ahmed Mohamed Ezzat, "Sustainable Development of Seaport Cities through Circular Economy: A Comparative Study with Implications to Suez Canal Corridor Project," European Journal of Sustainable Development, vol. 5, issue 4, pp. 509-522, 2016. Doi: 10.14207/ejsd.2016.v5n4p509

[3] Saeyeon ROH, Vinh V. THA and Yiik Diew WONG, "Towards Sustainable ASEAN Port Development: Challenges and Opportunities for Vietnamese Ports," The Asian Journal of Shipping and Logistics, vol. 32, issue 2, pp.107-118, 2016.

[4] TSINKER G.P, "Port engineering: planning, construction, maintenance, and security," New Jersey: John Wiley & Sons Inc, 2004.

[5] African Development Bank Group, "Transport Sector Review in Tanzania," 2013.

[6] Marilyn M. Helms and Judy Nixon, "Exploring SWOT analysis – where are we now?: A review of academic research from the last decade", Journal of Strategy and Management, vol. 3, issue 3, pp. 215-251, . 2010.

[7] Giang Huong Nguyen, "The Analytic Hierarchy Process: A Mathematical Model for Decision Making Problems," Bachelor Degree Thesis, The College of Wooster, 2014.

[8] Lu, C., Shang and K., Lin, C., "Identifying sustainability criteria for international ports," International Forum on Shipping, Ports and Airports in Hong Kong, pp. 27–29, 2012.

[9] Sislian, L., Jaegler, A and Cariou, P, "A literature review on port sustainability and ocean's Carrier network problem," Res. Transp. Business Management, vol.19, pp. 19–26, 2016.

[10] Roh, S., Thai, V., Wong, Y, "Towards sustainable ASEAN port development: challenges and opportunities for Vietnamese ports," Asian Journal of Shipping and Logistics, vol. 32, issue 2, pp.107–118, 2016.

[11] Hannah Oh, Sung-Woo Lee and Young-Joon Seo, "The evaluation of seaport sustainability: The case of South Korea," Ocean and Coastal Management, vol. 161, pp. 50–56, 2018. https://doi.org/10.1016/j.ocecoaman.2018.04.028

[12] Izabela Kotowska, "Policies applied by seaport authorities to create sustainable development in port cities," presented at 2nd International Conference "Green Cities - Green Logistics for Greener Cities", 2-3 March 2016, Szczecin, Poland. Transportation Research Procedia 16, 236 – 243, 2016.

[13] Vijay Hiranandani, "Sustainable development in seaports: a multi-case study," Wold Maritime University Journal Maritime Affairs, vol. 13, pp. 127–172, 2014. DOI 10.1007/s13437-013-0040-y

[14] C.A. Schippera, H. Vreugdenhila and M.P.C. de Jonga, "A sustainability assessment of ports and port-city plans: Comparing ambitions with achievements," Transportation Research Part D, vol. 57, pp. 84–111, 2017.

[15] Dijana Oreski, "Strategy development by using SWOT – AHP," Faculty of Organization and Informatics, University of Zagreb, Pavlinska 2, Varazdin, Croatia TEM Journal, vol. 1, issue 4, pp. 283-291, 2012.

[16] Vasantha WICKRAMASINGHE and Shin-ei TAKANO, "Application of Combined SWOT and Analytic Hierarchy Process (AHP) for Tourism Revival Strategic Marketing Planning: A Case of Sri Lanka Tourism," Journal of the Eastern Asia Society for Transportation Studies, vol. 8, pp. 1-16, 2009.

[17] Baiq Fitria Rahmiati, Dodik Briawan and Siti Madanijah, "Internal and External Factor Evaluation of Implementation Iron Supplementation Program in Tasikmalaya District," International Journal of Sciences: Basic and Applied Research, vol. 33, issue 3, pp. 22-30, 2017.

[18] F. Rashidinejad and Bahareh Asi, "SWOT Analysis of the Iranian Copper Industry," International Copper Ore Mining Congress, pp 1-9, 2012.

[19] Wenchang Li andYunfan Zuo, "Research on budget management under IT environment," presented at International Conference on Modern Economic Technology and Management, pp. 147-153, 2017.

[20] Sayyid Ali Banihashemi and Zahra Rejaei, "Assessment of environmental conditions and internal capabilities affecting University strategies (IFE, EFE, SWOT and AHP models)," International Journal of Asian Social Science, vol. 6, issue 10, pp. 558-567, 2016.

[21] Bahadır Çağrı BAYRAM and Tutku ÜÇÜNCÜ, "A case study: assessing the current situation of forest products industry in Taşköprü through SWOT Analysis and Analytic Hierarchy Process,", Kastamonu University, Journal of Forestry Faculty, vol. 16, issue 2, pp. 510-514, 2016.

[22] Osuna, E.E. and Aranda, A, "Combining SWOT and AHP techniques for strategic planning," ISAHP, Viña del Mar, Chile, 2007.

[23] Jeon, Y.A and Kim, J.S, "An application of SWAO-AHP to develop a strategic planning for a tourist destination,"16th Graduate Students Research Conference, Houston, Texas, pp. 6-8, 2011.

[24] Dijana Oreski, "Strategy development by using SWOT – AHP," TEM Journal, vol. 1, isuse 4, pp. 283-291, 2012.

[25] M. Kurttila, M., Pesonen, J., Kangas and M. Kajanus, "Utilizing the analytic hierarchy process (AHP) in SWOT analysis - a hybrid method and its application to a forest-certification case," Forest Policy and Economics, vol. 1, pp. 41–52, 2000.

[26] Collins-Kreiner, N., Wall, G., "Evaluating tourism potential: A SWOT analysis of the Western Negev," Israel,Tourism, vol. 55, isue 1, pp.51-63, 2007.

[27] M. Kurttila, M., Pesonen, J., Kangas and M. Kajanus, "Utilizing the analytic hierarchy process (AHP) in SWOT analysis - a hybrid method and its application to a forest-certification case," Forest Policy and Economics, vol. 1, pp. 41–52, 2000

[28] Collins-Kreiner, N., Wall, G., "Evaluating tourism potential: A SWOT analysis of the Western Negev," Israel,Tourism, vol. 55, isue 1, pp.51-63, 2007.

[29] Chang H.H, and Huang W.C, "Application of a quantification SWOT analytical method," Mathematical and Computer Modelling vol. 43, pp. 158–169, 2006.

[30] Vaidya, O and Kumar, S, "Analytic hierarchy process: An overview of applications," European Journal of Operational Research, vol. 169, issue 1, pp. 1–29, 2006.

[31] C. Dong, Y.F. Xu, H.Y.Li, and M. Dai, A, "Comparative study of the numerical scales and the prioritization methods in AHP," European Journal of Operational Research, vol. 186, pp. 229–242, 2008.

[32] Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., and Podsakoff, N. P, "Common method biases in behavioral research: A critical review of the literature and recommended remedies," Journal of applied psychology, vol. 88, issue 5, pp. 879-889, 2003.

[33] Irfan Ahmed Halepoto, Anwar Ali Sahito and Ghulam Mustafa Shoro, "Design of Integrated Analytic Process Framework for Smart City Transformation based on Strengths-Weaknesses-Opportunities-Threat Analysis," Sindh University Research Journal (Science and Series), vol. 47, issue 2, pp. 221-230, 2015.