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ENABLERS OF MUTUAL SATISFACTION IN TRANSNATIONAL PUBLIC INFRASTRUCTURE DEVELOPMENT: THE CASE OF SINO-GHANA

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Sino-Ghana relations have steadily grown over the years and have influenced the increase in various economic sectors especially infrastructure development in Ghana. The unique nature of Chinese corporations heavily engaged in Ghana's infrastructure development has captured research attention. Although several studies have been done on Sino-Ghana trade and infrastructure relations, little attention has been placed on the achievement of mutual satisfaction (MS) for both parties. It is crucial to empirically investigate MS in these partnerships since both parties having distinct interests, collectively work towards the provision of public infrastructure. This study adopted a three-staged approach of identification, assessment, and modelling of factors that enable the achievement of MS in transnational infrastructure partnerships. This involved an extensive review of literature and elicitation of views from purposively sampled private and public experts. The Interpretive Structural Modelling (ISM) approach was adopted in modelling the enablers which generated a systemic structure highlighting their relationships. Results indicated that enablers of achieving MS in these partnerships are interrelated and collectively act to create an environment of achieving mutual satisfaction. The enablers of MS include fair risk-bearing, equal and active participation of project parties, flexible contracting, strategic negotiation, efficient private and public sector capabilities, equitable distribution of project benefits, existence of mutual trust, and commitment. This paper provides an objective approach towards the quest for achieving mutual satisfaction and summarizes enablers that can be used in pushing the attainment of MS in China-Ghana infrastructure relations. Findings can be used as a basis for policy development uniquely for these partnerships to also improve the achievement of value for money and overall project success in China-Ghana infrastructure relations.

Keywords: Interpretive Structural Modelling (ISM), Mutual Satisfaction (MS), public infrastructure, Sino-Ghana, transnational

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INTRODUCTION

Infrastructure is a key measure of the development of any country as it creates an enabling environment for investments and livelihood which promotes economic growth and development (Ajakaiye and Ncube, 2010). This has steered the desire of most country leaders in Africa to strive for infrastructure development. Despite the evident efforts of these leaders, infrastructure development in Africa remains a challenge due to insufficient financial and technical resources. (Mitullah et al.,2016). Embracing foreign direct investments (FDIs) has become the go-to for most African countries towards bridging their infrastructure gap. In the vein of FDIs, studies show an enormous boom in Sino-Africa relations making China the highest donor and investor to African countries in recent times (Habiyaremye and Oğuzlu, 2014; Yu et al.,2019; Wang et. al., 2020).

Relations between China and Africa besides trading have seen a major impact in the aspect of infrastructure provision. China has steadily combined the extension and provision of financial aid for the construction of infrastructure in Africa (Alves, 2013). The Chinese belt and road initiative (BRI) in Africa has been influential in reducing Africa's infrastructure deficit with the provision of roads, ports, railways, energy, etc. (Ndzendze and Monyae, 2019). China's infrastructure engagement in Africa mostly comes as financial or technical aid or both through state-owned firms (Ubi, 2014) therefore projecting a unique transnational private sector initiative in Africa's infrastructure procurement.

African countries must maximize the Sino-Africa engagements to improve their infrastructure by tapping more into the moving trend of transnational public-private partnerships (TPPPs) (Cheng, 2019). TPPPs can briefly be defined as formalized international agreements between a private sector and public sector to deliver collective goods. In TPPPs the non-state actors (private sector) co-govern alongside the state actors (public sector) in the provision of the collective goods which is usually the sole mandate of the state actors (Schäferhoff et al.2009). This describes most Sino-African infrastructure engagements as China through their state-owned enterprises' partner with African governments in the provision of public infrastructure.

Despite, the undeniable evidence of China's aid in Africa's infrastructure, there lies some segmentation in literature on the prime motive of these investments. Some capture the intent of engaging in partnerships that are mutually beneficial and to promote and strengthen cooperation ties while others report that, it is some form of debt trap and interest in raw materials (Addis et al.,2020). Thus, Chinese investments in Africa often targeted to resource-rich countries need to be investigated uniquely. Addis et al., (2020) further stated that the sustainability and whether these partnerships and mechanisms culminate mutually satisfactory deals remains unseen. The realization of maximum benefit to both parties in these dealings requires a deliberate and concerted effort from both actors (Ndzendze and Monyae, 2019).

Given the unique nature of Sino-Africa infrastructure relations amid possible varying perceptions on the motives and overall achievement of mutual satisfaction or win-win for both parties, this study seeks to identify and assess factors that

enable and create the environment for the achievement of mutual satisfaction in these TPPPs. Eshun et al. (2020) conceptualized the achievement of mutual satisfaction or win-win as a system of interacting factors. Therefore, the identified enabling factors are assessed and modelled into a systemic structure (interactive system) using interpretive structural modelling (ISM) depicting how these enablers interact in attaining mutual satisfaction. The case of Ghana is considered in this regard as engagements of China in Ghana have also seen a significant boost.

LITERATURE REVIEW

Transnational Public-Private partnerships (TPPPs)

Despite the immense growth of TPPPs in most policy domains such as social rights and security, environmental politics, and development cooperation, views are divided pertaining to its emergence and description (Schäferhoff et al.2009). TPPPs are "institutionalized transboundary interactions between public and private actors, which aim at the provision of collective goods" (Schäferhoff et al.2009). These models generally move from a more publicly involved towards a more privately involved or owned engagements and are described based on three criteria i.e. actors, goals, and the sharing of risks and responsibilities. According to Park and Jun (2016), the definition of TPPPs is not clear-cut, as the scope can be very diverse hence this paper deduces a definition appropriate for analytical research. The realist perspective is adopted in this study describes Transnational PPPs as the resultant of the overlap between public and private actors 'interests which is an initiative-based approach towards solving a problem (provision of public infrastructure) by the collective action of these private and public actors (Park and Jun, 2016).

Mutual satisfaction in TPPPs

Studies have shown that public and private actors have varying interests in the delivery of public infrastructure. This has sprung up some shortcomings in the implementation of the project and therefore requires deliberate efforts to attain mutual satisfaction or win-win throughout the project life (Eshun et al., 2020). According to Grimshaw et al., (2002) evidence of the achievement of mutual satisfaction is little in these partnerships due to elements of power imbalance and inequitable distribution of project gains. Furthermore, these partnerships due to the dire need for funding and technical aid on the part of the public actors create room for a leader-follower relationship where, responsibilities, management, and deals are unfair (Shi et al.,2016). Differences in the prime interests of public and private actors are dynamic and therefore the need to continuously thrive for mutual satisfaction through strategic partnership activities (Kobylinska, 2017). This study describes mutual satisfaction as a conscious and continuous effort of project actors to ensure the prime interests of all parties are reasonably achieved. Additionally, following the description by Eshun et al., (2020) this study also considers the achievement of MS as a system of interacting factors where strategies should operate simultaneously for achieving MS.

Sino-Africa infrastructure relations

The rate at which China is engaging and investing in Africa is grabbing attention and such investments have experienced a huge leap in recent years (Ubi, 2014). In 2009, records indicated that China surpassed the world bank (the then top lender)

as Africa's lender and became the largest trading partner to the continent (Akyeampong and Fofack, 2019). China has made several infrastructure investments in Sub-Saharan Africa (Zhang et al., 2014). The nature of Chinese investments differs from that of other western countries due to their dominance of state-owned enterprises and the provision of readily available financial and technical aid hence cannot be treated like any other type of foreign direct investment (Auffray and Fu, 2015). To mention a few, China was involved in the Ethiopia-Djibouti Railway Project, the railway and pipeline predicted to link the ports in Kenya to oil fields in South Sudan and Uganda, expansion of the Suez Canal in Egypt, the Kano-Lagos railway line in Nigeria amongst others.

Sino-Ghana infrastructure relations

Dating back to 1960, Ghana and China established diplomatic relations which were aimed towards the development and strengthening of bilateral ties between the two countries. The relations between China and Ghana have grown over the years and Ghana has always been well poised to benefit from Chinese interest in funding infrastructure projects overseas (Gocking, 2020). Undoubtedly, China to some extent has propelled Ghana's economic and social growth as well as brought some more tangible benefits to the country. Ghana's infrastructure has seen commendable improvement since the involvement of the Chinese state-owned firms in sectors such as roads, energy, ports, among others. The Shanghai Construction Group played a significant role in the procurement of the national theatre in Accra which was built in 1992 (Odoom, 2017). The energy and water sectors in Ghana have also experienced support from China like the construction of the Bui Hydro-electric Dam and the Sunon Asogli Power Plant through dealings with the Shenzen energy group and China-Africa development fund. In recent times, national initiatives like the One District One Factory (1D1F), Planting for Food and Jobs and the Year of Roads Policy have benefited from Chinese corporations which provided the needed infrastructure such as roads, interchanges, warehouses, and offices.

Studies on the dealings between China and Ghana have also recorded a two-sided perspective being positive or negative to either party (Odoom 2017; Gocking, 2020). Mutually satisfactory deals for both actors are desired and fueled however the lack of managerial knowledge cripples its full glare. Most often the tendency of a win-lose outcome in such partnerships goes in favor of China (Bbaabla, 2015). A recent report on an interview with H.E. Lu. Kun the Chinese Ambassador to Ghana indicated that China is willing to take new measures to ensure the growth of friendship ties with Ghana. He however stressed the need to carry out collective dialogue and incorporation of effective mechanisms for more practical cooperation.

METHODOLOGY

The approach to this study was three-phased.

Stage I-Comprehensive literature review: The study commenced with a comprehensive literature review. This was aimed at identifying constructs or factors captured in previous studies about obtaining mutual satisfaction or generating a win-win situation for both public and private parties. This involved an extensive

probing of literature from online research libraries such as Web of science, Scopus and google scholar. The search was focused on studies relating to construction or infrastructure procurement, delivery, or development. The review yielded several constructs which are summarized and presented in table 4.2.

Stage II- Semi-structured expert interview: The results from the review formed the basis of this stage. The constructs identified were developed into the research instrument used for the semi-structured expert interview. Studies with conceptual and practical implications require the use of experts. The reliance on expert opinion remains dominant in most studies as they often serve as a basis for further empirical studies (Bhandari and Hallowell, 2021). This was aimed at refining and scoping the identified constructs into practical context unique to the nature of Sino-Ghana infrastructure provision. Experts engaged were academic and industry practitioners affiliated to either the private sector (China) or the public sector (Ghana). This study purposively contacted professionals who have been engaged (practice or research) in the delivery of public infrastructure projects which involve Chinese contractors and/or funding. Another relevant requirement was to engage professionals who have expertise in TPPPs and other infrastructure procurement routes hence they could effectively relay their current experiences and proficiency suitable to the purpose of the study. This led to the identification of 13 enabling factors of MS in transnational infrastructure provision also summarized in table 4.2.

Stage III- Development of the Interpretive Structural Model (ISM): The ISM method was developed to create a systematic problem-solving approach to complex issues (Sohani and Sohani, 2012). Results from the initial stages depict that the constructs identified collectively enable the attainment of mutual satisfaction hence establishing their relationships is key. Moreover, ISM can be pedigreed to Structural Modelling (SM) which is a method that uses words and visuals in thoroughly defined patterns to portray a structure, complex issue or system (Poduval and Pramod, 2015). The modelling approach in ISM produces a hierarchical structure and connectivities amongst the elements based on the pairwise relationship of the elements from the judgment of a group of experts. According to Eshun et al., (2020) in the delivery of infrastructure through TPPPs, the quest for achieving mutual satisfaction can be realized if enablers are integrated and addressed as a system considering their significant relationships. Hence making the ISM an ideal analytical approach for this study.

The representative factors summarized in Table 4.2 were structured into an ISM survey instrument and presented to a purposively sampled group of respondents. Official invitations were sent out to 23 experts out of which 15 participated. Studies have shown that the number of experts engaged in ISM does not have to be huge (Shen et al.,2016; Xu et al., 2020). They could even be as low as two (Ravi and Shankar (2005) if the appropriate experts are engaged. In cases of non-convergence in relationship determination by the experts, the majority rule was applied as per other similar studies (Shen et al.,2016; Saka et al.,2020) making the odd number participation ideal in this case.

The ISM steps are described as follows:

- Step1: Identification of the variables affecting the system i.e. enablers of MS in this study.

- Step 2: Establishment of the conceptual relationship between the variables identified in the initial step.
- Step 3: Development of the Structural Self-Iteration Matrix (SSIM) with the enablers of MS. This illustrates the pairwise relationships among the variables.
- Step 4: Development of the Reachability Matrix from the SSIM and transitivity check.
- Step 5: Level partitioning based on the Reachability Matrix. This includes determining the reachability, antecedent and intersection sets.
- Step 6: Development of a model based on the relationships denoted in the reachability matrix and hierarchical structure projected.
- Step 7: The ISM model is checked for conceptual inconsistency.

ANALYSIS AND DISCUSSION

Expert profiling

As captured earlier the adoption of ISM approach requires expert opinion in creating problem solving and systemic conceptualization of an issue based on pairwise relationships. A total of 15 experts were involved in this study. The distribution of these experts is presented in Table 4.1

Table 4.1 Expert profiling

Demographics	Category	Number	Percentage
Profession	Researcher	4	26.67
	Engineer	3	20.00
	Quantity surveyor	2	13.33
	Project manager	4	26.67
	Contractor	2	13.33
Type/ Job affiliation	Central Government	5	33.33
	Local Authority	2	13.33
	Private sector consultant	1	6.67
	Public sector consultant	3	20.00
	Academia	4	26.67
Years of Experience	Below 5 years	none	
	5 to 10 years	3	20.00
	11 to 15 years	6	40.00
	16 to 20 years	4	26.67
	Above 20 years	2	13.33
Number of Projects	1-5	1	6.67
	6-10	4	26.67
	11-15	5	33.33
	16-20	3	20.00
	21- 30	1	6.67
	Over 30	1	6.67

Interpretive Structural Modelling (ISM)

Establishment of enablers

This section presents the results from the literature review and scoping results from the expert interview.

Table 4.2 Identification of enablers of MS

ID	Representative Variables (Interview)	Literature Review Variables	Sources
E1	Fair risk bearing	Fair risk sharing	*Carbonara et al., 2014; Wu et al., 2018; Vassallo et al., 2012*
		Balancing of risks and responsibilities	*Storbjörk et al.,2019*
E2	Flexible Contracts	Relational and cooperative deals	*Storbjörk et al.,2019*
		Flexible contract terms	*Sang et al., 2019, Zhang, 2009*
E3	Mutually beneficial Project gains	Equitable Revenue guarantee structure and sharing	*Carbonara and Pellegrino, 2018a, Chen et al. 2018*
		Fair distribution of project gains	*Carbonara and Pellegrino,2018b, Tavakoli, and Nourzad, 2020*
E4	Efficient financial appraisal and funding package	Strategic financial planning and package	*Leviäkangas et al., 2016, Carbonara and Pellegrino,2018b*
		Optimum financial computation	*Leviakangas et al., 2013*
E5	Rational concession period and price arrangements	Reasonable Concession period	*Zhang 2011; Zhang and Chen, 2013, Hadi and Erzaij, 2019*
		Reasonable Concession price structure	*Tavakoli, and Nourzad, 2020; Zhang and Chen,2013*
E6	Mechanism for renegotiation of arrangements	Mechanism for renegotiation of arrangements	*Domingues and Zlatkovic,2015,*
E7	Periodic reappraisal of project risks	Mechanism for risk reappraisal	*Zhang 2011, Zhang and Chen, 2013*
E8	Efficient public and private sector expertise and capacity development	Adequate skills and knowledge capacity development	*Leviäkangas et al., 2016; Wakeford and Valentine, 2001*
		Technical innovation development	*Wu et al., 2018*
		Continuous performance improvement and innovation	*Am et al., 2014*
E9	Equal involvement and active participation of stakeholders in decision making	Collaborative management and assessments	*Feng et al, 2019*
		Active participation of both parties	*Am et al., 2014; Carbonara et al., 2014*
		Equal involvement of parties	*Shakibaei and Alpkokin, 2020*
E10	Active coordination and communication between parties	Coordination mechanism	*Wakeford and Valentine, 2001*
		Effective communication and dialogue methods	*Domingues and Zlatkovic,2015 ; Wakeford and Valentine, 2001*
E11	Strategic conflict resolution and Contract negotiation	Cooperative partnership	*Liou et al., 2011*
		Convergence of interests in negotiation	*Liou et al., 2011; Shakibaei and Alpkokin, 2020*
		Simultaneous maximization of interests	*Repolho et al. 2016*
E12	Ensuring balance of Power between parties	Balance of power between parties	*Grimshaw et al., 2002*
		Ensure equal bargaining power or stands	*Interview*
E13	Mutual trust and commitment	Commitment enhancement	*Domingues and Zlatkovic, 2015; Storbjörk et al.,2019*
		Mutual trust	*Interview*

Structural Self-Interaction Matrix (SSIM)

The development of the SSIM reflects the pairwise relationships between the enablers. The enablers are built into a matrix where these variables are written on an X-axis and Y-axis Pane. Where Cell Eij of the matrix shows the relationship direction between variable Ei (on the X-axis) and Ej (on the Y-axis). This reveals the interpretive logic of the 13 enablers in the model. The relationships are defined as follows:

V = Ei influences or helps to achieve Ej whereas Ej does not influence or helps to achieve Ei

A = Ej influences or helps to achieve Ei whereas Ei does not influence or helps to achieve Ej

X = Ei influences or helps to achieve Ej and Ej influences or helps to achieve Ei

O = Ei and Ej are unrelated.

Table 4.3 Structural Self-Interaction Matrix (SSIM)

i \ j	E13	E12	E11	E10	E9	E8	E7	E6	E5	E4	E3	E2	E1
E1	X	X	X	A	A	A	V	O	V	X	V	O	X
E2	O	V	V	A	A	A	V	V	O	O	O	X	
E3	A	O	O	O	A	O	O	O	X	A	X		
E4	O	O	O	A	A	A	O	O	X	X			
E5	O	O	O	A	A	A	O	O	X				
E6	O	V	X	A	A	O	X	X					
E7	O	V	X	A	A	A	X						
E8	O	O	V	V	V	X							
E9	X	V	V	X	X								
E10	X	V	V	X									
E11	A	O	X										
E12	A	X											
E13	X												

Reachability Matrix (RM)

The conversion of the SSIM into a Binary Matrix is the Reachability Matrix (RM). The RM is developed by expressing the information in the SSIM in 0s and 1s. This is achieved through the application of the following conditional rules to the cells in the SSIM.

If the ij entry in the SSIM is;

- X, the (i,j) in the reachability matrix becomes 1 and the (j,i) entry becomes 1
- V, the (i,j) in the reachability matrix becomes 1 and the (j,i) entry becomes 0

- A, the (i,j) in the reachability matrix becomes 0 and the (j,i) entry becomes 1
- O, the (i,j) in the reachability matrix becomes 0 and the (j,i) entry becomes 0

Table 4.4 illustrates the results of the conversion of the SSIM to the binary matrix. For instance, cell E1/E7 is V in Table 4.3 and the resultant binary figure becomes 1 for cell E1/E7 and 0 for cell E7/E1 in Table 4.4 as per the conditions stated above.

Table 4.4 Reachability Matrix

ID	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13
E1	1	0	1	1	1	0	1	0	0	0	1	1	1
E2	0	1	0	0	0	1	1	0	0	0	1	1	0
E3	0	0	1	0	1	0	0	0	0	0	0	0	0
E4	1	0	1	1	1	0	0	0	0	0	0	0	0
E5	0	0	1	1	1	0	0	0	0	0	0	0	0
E6	0	0	0	0	0	1	1	0	0	0	1	1	0
E7	0	0	0	0	0	1	1	0	0	0	1	1	0
E8	1	1	0	1	1	0	1	1	1	1	1	0	0
E9	1	1	1	1	1	1	1	0	1	1	1	1	1
E10	1	1	0	1	1	1	1	0	1	1	1	1	1
E11	1	0	0	0	0	1	1	0	0	0	1	0	0
E12	1	0	0	0	0	0	0	0	0	0	0	1	0
E13	1	0	1	0	0	0	0	0	1	1	1	1	1

Level partitioning

This outlines the hierarchical structure of the model. To partition the variables into levels, three computations are made i.e., the reachability set, antecedent set, and intersection set. The reachability set is a set for the enablers (variables) which includes itself and any other variables with a value of one in the corresponding row. The antecedent set also includes itself and any other variables in the corresponding column. The intersection set includes the common items (variables) in both the antecedent and the reachability set. The level partitioning is done by labelling the variables (enablers) with the same items in the reachability set and the intersection set. For instance, E5 had reachability set as (3,4,5) and intersection set (3,4,5) hence qualifies to the labelled as level one. Similarly, E11 had common items of (1,6,7,11) in both the reachability and intersection sets and labelled as level one.

Next, the partitioned enablers are removed from the iteration and the reachability, antecedent and intersection sets are checked again to determine the level two partition for the remaining enablers. The enablers with the same items in the reachability and intersection sets are labelled at level two until no such similarities are identified. The enablers labelled at level two are then removed from the iteration and again the reachability, antecedent and intersection sets are checked to define the subsequent level. The same process is repeated until all the enablers are partitioned. The results are presented in table 4.5.

Table 4.5 Iteration table for level partitioning

Enablers	Reachability set	Antecedent set	Intersection set	Level
Level 1				
E1	1,3,4,5,7,11,12,13	1,4,8,9,10,11,12,13	1,4,11,12,13	
E2	2,6,7,11,12	2,8,9,10	2	
E3	3,5	1,3,4,5,9,13	3	
E4	1,3,4,5	1,4,5,8,9,10	1,4,5	
E5	3,4,5	1,3,4,5,8,9,10	3,4,5	I
E6	6,7,11,12	2,6,7,9,10,11	6,7,11	
E7	6,7,11,12	1,2,6,7,8,9,10,11	6,7,11	
E8	1,2,4,5,7,8,9,10,11	8	8	
E9	1,2,3,4,5,6,7,9,10,11,12,13	8,9,10,13	9,10,13	
E10	1,2,4,5,6,7,9,10,11,12,13	8,9,10,13	9,10,13	
E11	1,6,7,11	1,2,6,7,8,9,10,11,13	1,6,7,11	I
E12	1,12	1,2,6,7,9,10,12,13	1,12	I
E13	1,3,9,10,11,12,13	1,9,10,13	1,9,10,13	
Level 2				
E1	1,3,4,7,13	1,4,8,9,10,13	1,4,13	
E2	2,6,7	2,8,9,10	2	
E3	3	1,3,4,9,13	3	II
E4	1,3,4	1,4,8,9,10	1,4	
E6	6,7	2,6,7,9,10	6,7	II
E7	6,7	1,2,6,7,8,9,10	6,7	II
E8	1,2,4,7,8,9,10,	8	8	
E9	1,2,3,4,6,7,9,10,13	8,9,10,13	9,10,13	
E10	1,2,4,6,7,9,10,13	8,9,10,13	9,10,13	
E13	1,3,9,10,13	1,9,10,13	1,9,10,13	
Level 3				
E1	1,4,13	1,4,8,9,10,13	1,4,13	
E2	2	2,8,9,10	2	III
E4	1,4	1,4,8,9,10	1,4	III
E8	1,2,4,8,9,10	8	8	
E9	1,2,4,9,10,13	8,9,10,13	9,10,13	
E10	1,2,4,9,10,13	8,9,10,13	9,10,13	
E13	1,9,10,13	1,9,10,13	1,9,10,13	III
Level 4				
E1	1	1,8,9,10	1	IV
E8	1,8,9,10	8	8	
E9	1,9,10	8,9,10	9,10	
E10	1,9,10	8,9,10	9,10	
Level 5				
E8	8,9,10	8	8	
E9	9,10	8,9,10	9,10	V
E10	9,10	8,9,10	9,10	V
Level 6				
E8	8	8	8	VI

Results show that E8 "Efficient public and private sector expertise and capacity development" and E1 "Fair risk-bearing" were the enablers solely captured in a level i.e., levels VI and IV respectively. Furthermore, E12 "ensuring balance of power between parties", E11 "strategic conflict resolution and contract negotiation" and E5 "rational concession period and price arrangements are captured as level I. Also, E6, E3, and E7 namely, mechanism for renegotiation of arrangements, mutually beneficial project gains, and periodic reappraisal of project risks were captured in level II. The fifth level includes equal involvement and active participation of stakeholders in decision making and the active coordination and communication between parties.

ISM-based Model.

This is developed based on the relationships captured in the reachability matrix and partitioning levels. The results from the transitivity checks as described in the ISM steps showed the existence of very dense transitive links among the variables affirming the hypothetical stand of the study that the enablers act as a system of interacting factors that affect each other and should function jointly. The connectivity between the enablers show that they act collectively in the achievement of mutual satisfaction. The structural model shown in Figure 1 depicts significant links.

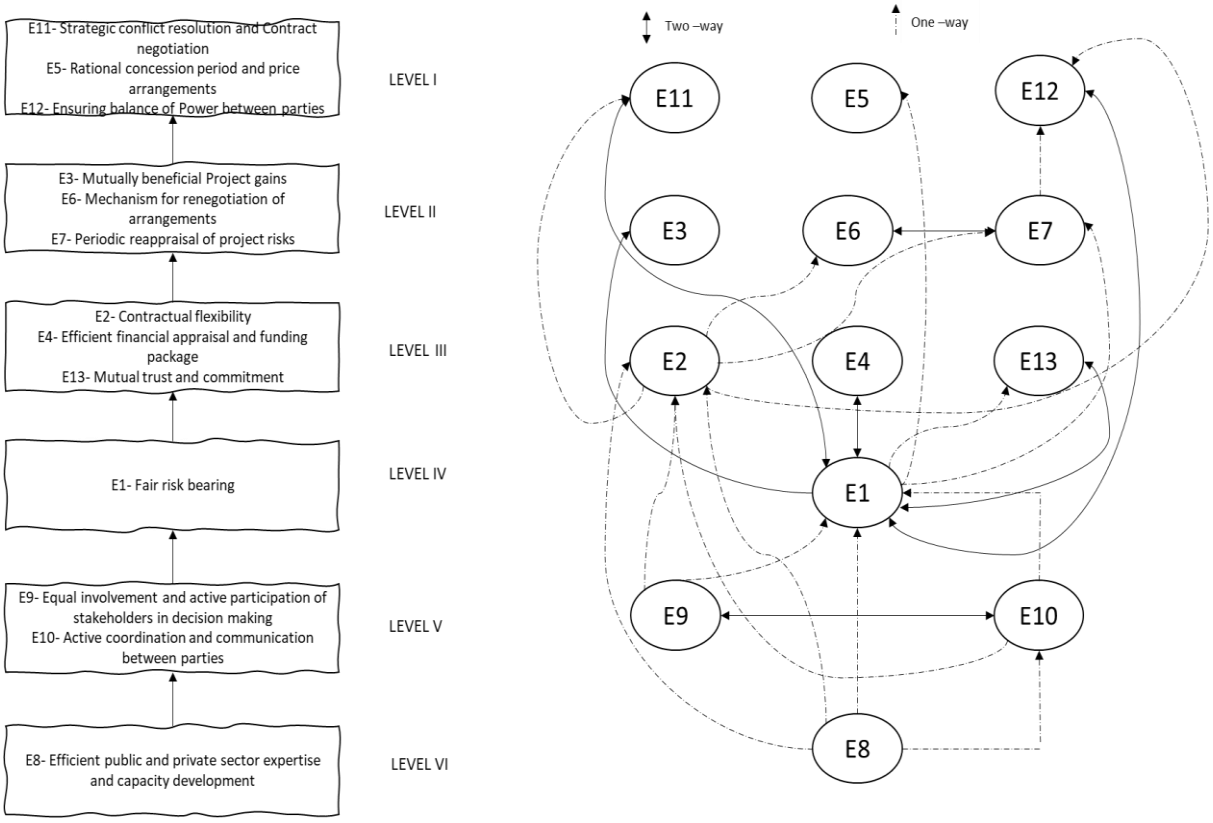


Figure 1; ISM based Model

The model gives a systemic view of the enablers for achieving MS. The results indicate that the top enablers include E12 "ensuring balance of power between parties" E11 "strategic conflict resolution and contract negotiation" and E5 "rational concession period and price arrangements" however the efficient public and private sector expertise and capacity development (E8) at the bottom of the system

should be focused on since it initiates and forms the bedrock of the structure. Falling at the base of the structure means it influences all the other enabling factors hence the quest for MS should begin with deliberate capacity development of both private and public sectors. Furthermore, the equal involvement and active participation of stakeholders in decision making (E9) as well as active coordination and communication between parties (E10) promotes the attainment of MS and contributes to the fair sharing of risks and so on.

MICMAC analysis

This creates an improved interpretation of the behavior of the enablers in the model. This analysis was much needed in this study due to the complex nature of the links between the enablers. The main objective of this analysis is to determine and assess the driving and dependency powers of the enablers. The driving power is the sum of 1s on the rows and the dependency variables the sum of 1s on the column from the reachability matrix. These values are presented in table 4.6 and form the X and Y axis used in plotting the graph shown in figure 3. The MICMAC analysis groups the enablers into four clusters namely independent, linkage, autonomous and dependent variables.

Table 4.6 Driving and Dependency powers

Enablers of MS	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13
Driving power (y-axis)	8	5	2	4	3	4	4	9	12	11	4	2	7
Dependency power (x-axis)	8	4	6	6	7	6	8	1	4	4	9	8	4

The inputs of table 4.6 is used in plotting the graph for the MICMAC analysis. The graph is divided into four equal quadrants as shown the figure 3. The top right corner is the linkage quadrant while the top left is the independent quadrant. The bottom right is the dependent and the bottom left is the autonomous quadrant.

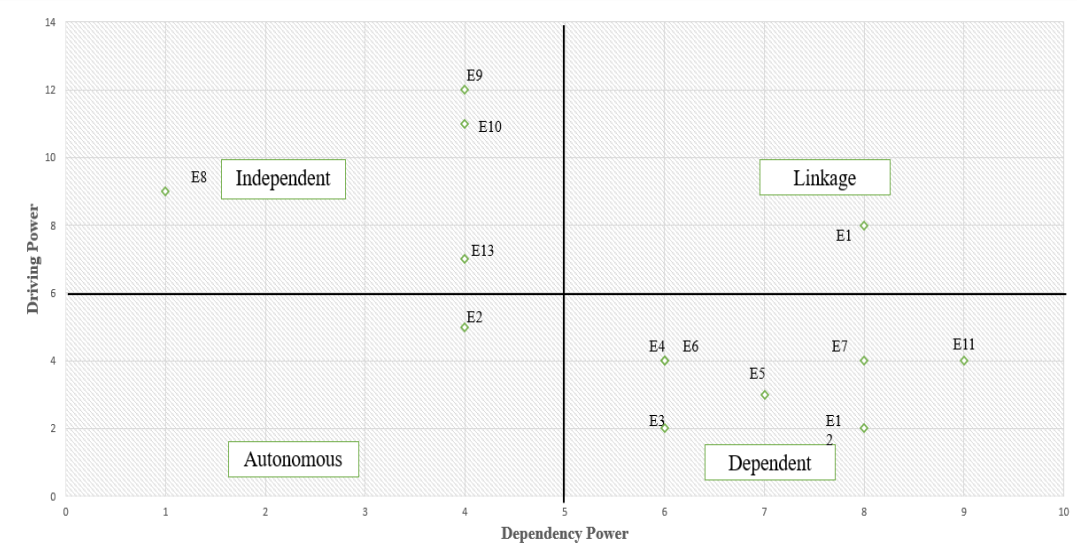


Figure 2; MICMAC Analysis of enablers.

Q1- Independent enablers; these are the enablers that exhibit a high driving power with low dependency power. They include efficient public and private sector expertise and capacity development, mutual trust and commitment, active

coordination and communication between parties and equal involvement and active participation of stakeholders in decision making. It is evident that these independent enablers are unique in classification as they refer to the people or human actors (i.e. the private and public sector stakeholders) involved in the partnership.

Q2- Linkage enablers: these are the enablers with both strong driving and dependence power. These are the variables that are unstable and any action on these variables will have an effect on the others at the same time have feedback on themselves. The enabler in that category is the fair risk-bearing.

Q3- Autonomous enabler- these are considered are those variables somewhat disconnected from the system since they have low dependency and driving powers. Flexible contracts belong to the autonomous group in this study.

Q4- Dependent enablers- they have high dependency power with low driving power namely efficient financial appraisal and funding package, mechanism for renegotiation of arrangements, rational concession period and price arrangements, periodic reappraisal of project risks, strategic conflict resolution and contract negotiation, mutually beneficial project gains and ensuring balance of power between parties. These enablers rely on other factors to be established.

Discussion

Parties to any infrastructure project execution desire to meet their individual interests and motives for engaging in that partnership. The expert-based ISM model developed in this study generally affirms the hypothetical claim that the achievement of MS acts as an ecosystem of factors interacting with each other. This was also captured by Eshun et al.,(2020) in their study of conceptualising a win-win scenario in public-private infrastructure partnerships. The modelling shows that the quest for MS in Sino-Ghana relations relies on the two major actors involved. The capacity and character exhibited by these parties go a long way to affect all the other enablers in the system shown in Figure 2. This agrees with a study by Ndzendze and Monyae (2019) which concluded that the realisation of maximum mutual benefit in these dealings requires additional and concerted effort from both China and the authorities of these African countries. Auffray and Fu, (2015) from their Sino-Ghana study established that there is lack of managerial knowledge on the part of the project actors which requires more effort to improve. These actors must display a commendable degree of trust and commitment while ensuring a balanced representation of stakeholders in decision making on the project (Grimshaw et al., 2002; Feng et al, 2019). The use of flexible contracts is a step in the right direction for MS as it provides the opportunity to reappraise and make rational adjustments to terms susceptible to uncertainties (Storbjörk et al.,2019). According to Domingues, and Zlatkovic, 2015), renegotiation of contract terms facilitates MS as a way of adjusting to real time project dynamics. The basis of transnational PPPs falls on the interest of the actors and the treatment of risk. MS can be achieved if partnerships ensure fair sharing of risks as well as developing financial models that are mutually beneficial and project reasonable payback terms (Carbonara et al., 2014; Tavakoli, and Nourzad, 2020). Shakibaei and Alpkokin, (2020) asserted that parties to any infrastructure project with the desire to meet or fulfil each other's interest must be strategic about negotiation. The negotiation

process allows both parties to solicit win-win or MS goals and reach a fair ground favourable to all. Strategic negotiation should be planned such that both parties display equal bargaining power to prevent asymmetry of terms towards the party with the upper hand (Grimshaw et al., 2002). This will prevent the leader-follower perception of some studies regarding China-Africa infrastructure partnerships (Shi et al.,2020). Strategic negotiation as an enabler for MS does not only capture the procurement stage but negotiations when conflicts arise. Shakibaei and Alpkokin, (2020) purported that conflict resolution strategies adopted by the project stakeholders can influence the achievement of MS during execution.

CONCLUSION AND IMPLICATIONS

Generally, the involvement of the private sector to co-govern and administer the provision of public infrastructure i.e., TPPPs tend to project varying interests, power imbalance and opportunistic behaviour. The unique nature of Chinese corporations investing in Ghana and Africa at large is that these firms are state-owned. This positions the study in the theoretical lens of international relations and governance beyond the state. Though the role of the Chinese state and its organisations in Africa have been considered by some studies as generally pessimistic, further reading suggests that this assertion can be contested. This has drawn a cross perception between these actors and is gradually and consciously fuelling the need to thrive for mutual benefits built on strategic partnership deals and activities. The TPPP lens used in this study provides a well-structured and commonly recognised procurement route that facilitates the objective determination of factors that enable the achievement of mutual satisfaction in Sino-Africa relations at large. The achievement of mutual satisfaction or win-win portrays the desire to achieve project success in fairness to both actors (China and Ghana). Given the established desire for MS, this study aimed at identifying, assessing, and modelling factors that enable the achievement of MS in TPPPs. This was achieved through literature review and expert judgement based on semi-structured interviews and the ISM instrument. The ISM approach was used to establish the relationships and connections between the enablers as a system. Results indicate that attaining MS is processual and involves taking certain measures and activities while focusing on how they influence or affect each other. The MS model presented in this study was developed based on system principles which means that the enablers identified must act collectively for a better realisation of MS in TPPPs. For instance, having fairly shared risks without allowing some contractual flexibility that enables reappraisal of risks to adapt to reality during project implementation defies the course of promoting MS or win-win. These enablers can be used in establishing determinants, unique to the actors involved in the TPPPs and evaluated to predict the tendency of MS achievement from that partnership. Further investigation can be done to assess the shortfall of Sino-Ghana infrastructure partnerships in relation to the quest for MS and findings can be prioritised in planning such partnerships. In view of this, policies and well-defined structures can be put in place to manage Sino-Ghana infrastructure partnerships to ensure mutual satisfaction, promote more of such engagements and strengthen cooperation ties.

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