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AN EVALUATION OF THE FACTORS FOR A SUCCESSFUL ALLIANCE IN THE UNITED KINGDOM (UK) CONSTRUCTION INDUSTRY

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Abstract: Numerous authors have advocated that the construction industry should have advanced and moved away from being an industry beset by 'late delivery, cost overruns and commercial friction'. As the industry examines possible solutions, there has been considerable research and interest in alternative methods of contracting such as 'alliancing'. The aim of this research was to provide a critical review and analysis of the factors contributing to a successful construction alliance in order to identify key factors. A critical literature review highlighted six key factors. These were incorporated into a theoretical framework, which was then tested empirically, using a qualitative methodology. Interviews, with senior construction professionals, active in UK alliancing projects, were conducted and thematic analysis was used to analyse the data collected; comparing interview results with the theoretical framework. The research concluded that four out of the six factors were shown to be significant contributory factors in successful alliances. Following a comparative review between the literature outcomes and the empirical findings a revised framework was produced. The revisions to the framework introduced two new factors: clear investment strategies and the need for clear risk management processes. In conclusion, the research has identified key factors in the success of construction alliances. The final framework could now be tested further empirically, using a larger sample of research participants, in order to validate the research.

Keywords: alliancing, framework, thematic analysis

1. INTRODUCTION

The Department for Business Innovation and Skills [DfBIS] (2013) report highlights the construction industry's value to the UK economy and, states that by 2025 construction should have advanced and moved away from an industry beset by, *"..late delivery, cost overruns and commercial friction."* (DfBIS, 2013, p.18). As the industry examines possible solutions, there has been considerable research and interest in alternative methods of contracting as an approach to improve construction performance. Forming an alliance is one method of relational contracting that relies upon communication, trust and common goals to succeed (John et al., 2012). Smyth and Pryke (2008, p.245) suggest that successful improvement in innovation should not ignore, *"...the human and social dimension of managing projects."* They also contend that value added approaches have, *"...for too long been considered as something added through inanimate tools and techniques."* The Royal Institution of Chartered Surveyors [RICS] (2015) states that construction skills shortages are causing projects to experience difficulties with greater separation of project roles thus contributing to the poor performance which the UK Government has identified. RICS (2015) also suggests that problems were being encountered due to the exit of many experienced construction trades people and professionals following the global financial crisis of 2008. Considering a mixture of perspectives, the purpose of this research is to examine contemporary concepts and determine whether they will contribute to a successful construction alliance. Construction projects are rarely a repeat process, often being characterised by fragmentation of specialist functions that contributes to poor performance and

low satisfaction; relationships have traditionally been transactional and do not incentivise development beyond the immediate near term priorities (Fellows & Liu, 2012).

The aim of this research was to provide a critical review and analysis of the factors contributing to a successful construction alliance in order to identify key issues and factors. This aim was achieved by setting a series of objectives. Firstly, a critical literature review was conducted in order to identify key factors, and produce a theoretical framework. Secondly, the framework was then tested empirically using expert interviews. Finally, theory was compared with the test outcomes in order to present a revised framework. This paper summarises research conducted as part of a Masters degree dissertation study (Burton, 2016).

2. LITERATURE REVIEW

2.1 What is an alliance?

Bi-lateral contracts constrain how each party behaves due to their profit and target driven nature (Smyth & Pryke, 2008). If a company is operating a contract at a loss, the project team will be incentivised to alter its position through the recovery of claims. Macdonald (2005, p.1) describes 'relationship contracting' as, *"...a delivery method, including partnering and alliancing as a method that delivers mutually acceptable outcomes for all parties"*. Walker and Walker (2016, p.89) contend that, *"...alliances generally provide sound outcomes that overcome critical problems encountered in many traditional transactional approaches to complex construction infrastructure delivery projects."* Attempting to define what an alliance is would be prudent and allow for an understanding of what an alliance agreement can be considered to be, and how it is different from other forms of relationship and traditional contracting such as partnering. According to Chen et al. (2012) their literary review demonstrated that the critical difference between alliancing and partnering is the consideration of risks undertaken versus rewards given, and that alliancing can be defined by its ability to provide its various actors rewards for exceeding the defined performance thresholds, and suitably compensate those who have suffered from a lack of performance. Ingirige and Sexton (2006) determined that the benefits of alternative arrangements, where considerable value can be developed, were not being achieved due to overarching pressure to ensure profitability. Walker and Hampson (2003) stated that alliances are formed and can be categorised from two perspectives: reactive and proactive. They identify the needs by the characteristics shown from their review into the research of others, in that a client or similar organisation has stated a particular requirement and the responding organisations react and form an alliance in order to satisfy that requirement. For example, one of the first alliance projects conducted in Australia, the Wandoo-B oil platform, adopted an alliancing approach because of the client's poor previous experience with a traditional procurement method which resulted in time and cost overruns (Jefferies et al., 2008). Proactive organisations form similar arrangements in anticipation of the requirements demanded by the receiving organisation. Clegg et al. (2002) contend that alliance contracts are a development to avoid the climate of mistrust where participants operate with duplicity and trust is limited. More recent research by Walker and Walker (2016) supports the importance of competitive advantage, resource and capability issues in alliancing.

2.2 Legal considerations

Barnes and Davies (2014) contend that there are four key functions of a traditional construction contract: allocation of risks and the relationship between risks assumed, compensation, disputes and insurance; reduction in effort to document roles and responsibilities; bespoke documents increase transaction costs, and validation of the business model by providing a framework for practice. What is not clear from literature is the basis for the legal formation of an alliance, whether or not it uses advanced technological practices. A relational approach to a contract would provide greater emphasis on the formalisation of task and production monitoring. This approach would offer advantages over bi-lateral contracts that contribute to undesirable behaviours. Initial contract design can significantly influence the outcomes and relationship dynamics between parties (Faems et al., 2008). Such a perspective does not give a clear indication as to other factors that may be different to traditional forms of contract. For example, the removal of damages clauses for poor performance may prevent a spurious claim being presented in order to maintain a return of profit. Also stakeholder maturity is a factor rarely considered which can have a critical impact on the success of alternative arrangements. Ahbahi (2014) reasoned that most collaborative behaviours were required to happen due to unreasonable expectations with minimal input to support the process. The variety of outcomes may impose limitations or support contradictory behaviour to that which is sought and, as such, legal issues are worthy of consideration in this research.

2.3 Technological advancements

Onging advancements in technology present both significant challenges and opportunities to the construction industry. Parametric Building Information Models (BIM) continue to replace coordinate based geometric models in order to enhance asset whole lifecycle performance. BIM can be used to enhance a building's design in order reduce it's energy usage and initial capital expenditure by selecting an off-site construction method (Eastman et al., 2011). BIM and off-site manufacturing are just two developing innovations and neither can be considered as recent developments. Halttula et al. (2015) suggest that BIM has been forecasted to solve several problems, but concede that BIM has not always been able to deliver on many of the promised outputs. Many reasons have been given throughout literature for the low adoption of BIM. Barnes and Davies (2014) cite the high training costs whose requirements are very diffuse to identify and vary considerably from one environment to the next. They also describe a skills gap and identify the need for industry standards. Zhao et al. (2015) concluded that educational courses were found to be taught with minimal contextual background and assessed against largely academic criteria. They conducted a series of literature reviews and developed a case study for their research into education and training for BIM and advanced construction processes. The narrow breadth of the research conducted cannot be deemed to apply to all education and training courses. However, the research does highlight the lack of industry support in developing appropriate training. With the construction industry supporting education there is a danger that it may be developed without due consideration to practical application. Zhao et al. (2015) identified a lack of skills in many aspects; not just in the operation of BIM functions.

2.4 Satisfaction and value

The term 'value', as described within a dictionary, gives many meanings in multiple contextual environments. Barima (2010, p.195), in her triangulation study of primary resources, determined that, "…perceived value from the lenses of potential stakeholders can be complex." Acknowledging the limitations of the research, Barima (2010) suggests that the study can increase it's understanding by repeating the research in different environments and cultures. Mills et al. (2009) identified trends within their research that may suggest certain companies and individuals can improve their respective performances, leading to improved satisfaction, with greater value alignment. In their case study research Mills et al. (2009) attempted to classify behaviours and qualities attributed to value. Research in the area of satisfaction and value is neither absent nor underdeveloped, yet most research has been conducted in a reactive manner and reaches similar conclusions in that value is a metaphysical property that is beholden to what is perceptible, and as such appears to be relevant to a construction alliance context.

2.5 Competitive advantage

Competitive advantage, by its definition, seeks to obtain a superior position. How an advantage is shaped could be multi-faceted. An organisation that reduces its risk exposure in comparison to a competitor has gained an advantage. The formation of advantages and how they are developed should be considered. Moinggeon and Edmondson's (1996) review of secondary sources concludes that organisational learning is a source of competitive advantage. They conclude that organisational learning can be categorised into four main areas: organisations as embodiments of past learning; individual learning and development in organisations; organisations increasing the capacity for change through active intelligent participation, and individuals gaining awareness of personal causal responsibility and interpersonal skills. Their use of secondary sources, however, constrains the ability of the authors to make generalisations for all possible scenarios. It remains possible that a fifth unknown scenario could be discovered by further research. The authors also do not express the limitations of the research and do not consider wider management theories in business environments. Moinggeon and Edmondson (1996) could have benefitted from a review of Fiedler's contingency theory. Mitchell et al. (1970) validated the theory's main conclusions that organisational leadership and learning is more influenced by situational circumstances. Their primary sourced research contends that there is no single ideal way as one approach may not prove effective in subsequent applications. Irrespective of the differing positions, the literature broadly supports a link between competitive advantage and construction alliances.

2.6 Performance barriers

It would be illogical to assume that an alliance will be successful in every alliance formation. If an alliance is expected to succeed it is of value to examine why an alliance may not perform as well as expected. These terms will have subjective values to each individual; success to one person or group may be deemed a failure by another. Ngowi (2001) concluded that alliances were not necessarily sought solely to improve project performance; it was equally likely they were necessary to improve business performance in order that more new competitive market entrants could be successfully competed against or prevented from competing at all. Ngowi's (2001) analysis suggested that culture, values and expectations were the most significant barrier

to improving performance. These findings are supported by the research of Walker and Walker (2016), identifying the importance of 'behavioural factors'. These analyses highlight the importance of continued reflection and adaptation during the alliance lifecycle. Lavie et al. (2012) conducted interviews and would challenge Ngowi's (2001) point of view. They collected survey data in order to test a number of hypotheses related to organisational similarities. Their research concluded that similarity in partners' organisational and operational routines are critical to success and enhance performance. The most discernible aspect of their conclusions, which suggests deep complexity, determines that cultural difference has limited effect if the organisations are similar. This apparent complexity is suggested to be influential and may illuminate further appropriate factors of relevance to construction alliances.

2.7 An Alliance theoretical framework

Having critically reviewed literature relating to construction alliancing six factors have emerged relating to influence and interaction within an alliance arrangement; they are illustrated in Figure 1 within a theoretical framework. It cannot be determined from the literature reviewed that documented research has considered all factors in every piece of research. The framework is therefore proposed on the premise that the identified six factors are all required to develop a successful alliance in a construction environment. Each factor can therefore be considered as an independent variable requiring others to be addressed in order to create a successful construction alliance; Figure 1 illustrates this. However, by not linking these six factors directly, this shows that the factors are not interdependent.
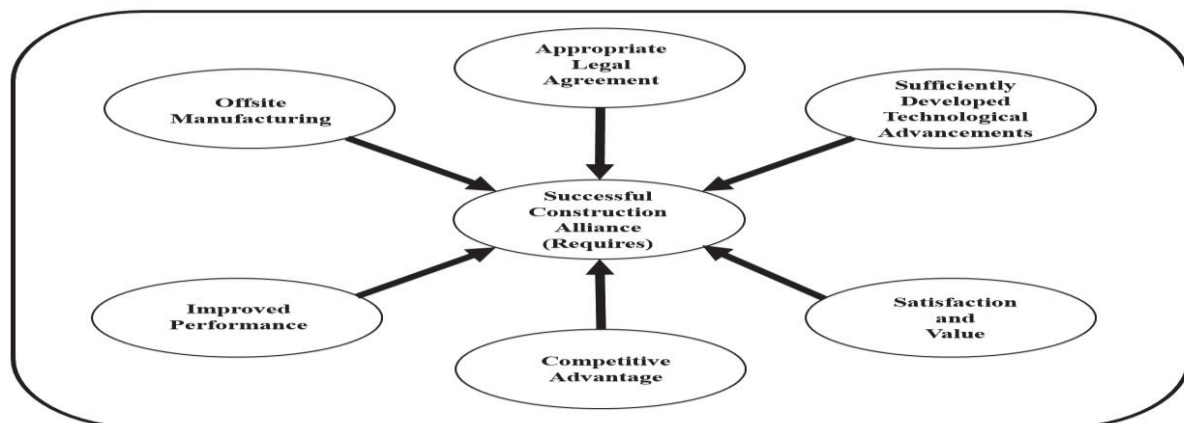

Figure 1: Theoretical Alliance Framework

3. RESEARCH METHOD

This section reviews and develops the research design and considers how the methodology will provide a sound basis for the chosen research method to achieve the research aim and associated objectives. The research method will allow the theoretical framework to be tested and critically examined using empirical data.

3.1 Research approach

Selecting appropriate methods to test the research objectives leads the research to consider questionnaires and interviews due to the methodological focus. Considerable literature is available for researchers concerned with epistemology which implies the notion that qualitative research is for the generation of theory and quantitative is for the testing of theory. For example, Bryman (1992) advocates that considerable benefits can be obtained where a stance in the research method is taken that avoids falling into these narrow paradigms. Hyde (2000, p.82) states that, *"Introducing formal deductive procedures into qualitative research can represent an important step towards assuring conviction in qualitative research findings..".* Such procedures may resist criticism regarding the inadvertent inclusion of mixed methods research. Positivist theory testing is concerned with the assessment of facts and phenomena in a manner that is often repeatable by another researcher; facts are gathered, quantified and analysed in a method that can be repeated. Bitekine (2007) contends that deductive research with quantitative methods is tested on elements of the environment that are compliant to quantification and statistical methods of analysis. A naturalist interview approach was selected for this research on the basis that it permitted the wider exploration of factors identified in the literature review that a questionnaire approach might inadvertently avoid through the absence of sufficiently detailed information beforehand.

3.2 Data collection method

Having given due consideration to alternative methodological approaches, a data collection method was adopted utilising semi-structured interviews.   The aim of the research was to discover what factors can make an alliance successful. To confirm that a factor does indeed contribute to success, a low number of observations will be needed to confirm the suitability and relevance of the factor in question. Bryman et al. (2008) confirms such an approach as valid and avoids the need to confirm simultaneous factors. If the question had an inverted approach, that is to say every successful alliance has the following factors, a much greater population sample would be necessary to achieve saturation. Francis et al. (2010) conducted studies on saturation with interviews of medical personnel. Their findings concluded that saturation occurred at relatively low numbers of around ten interviews on complex subject matters. This research demonstrated that factors can be confirmed with small samples as the factors were neither relevant, nor necessary, in every case. For this research it can be contended that large samples are not practical and are unlikely to produce further information given the loose association of the factors evident from the prior literature review. A population sample of six was chosen which was considered sufficient given the apparent loose association of the factors. With a narrow sample population, only persons in suitably appropriate positions were approached using publically available information and requested to participate in interviews. These individuals were screened for significant senior experience of working on alliancing projects in the UK to establish their suitability to competently answer the interview questions. The use of expert interviews is supported by the work of Walker and Walker (2015) who used them in their research into international relationship-based project procurement.

An interview schedule of 22 questions was developed, linked to the six key factors presented in the theoretical framework. In addition the questions were sufficiently open to allow full exploration of the topic to collect deep and rich information. A small pilot study was conducted to test the questions; in particular with regard to clear understanding to elicit valid and reliable

responses. Before any individuals were approached ethical approval to conduct the research was obtained from the University.

3.3 Data analysis method

The analysis of qualitative interview data often uses thematic analysis as it is widely used and accepted by researchers. Aguinaldo (2012) contends that thematic analysis has no accepted regular approach owing to the variances in collected research data. Hewitt et al's. (2010) research supports the views of Aguinaldo and used thematic analysis to transform significant quantities of interview data into a condensed summary analysis. Such a method of analysis allows prominent themes to be drawn together from different data sets allowing appropriate conclusions to be drawn. Interviews were recorded and transcribed to allow relevant content to be identified in subsequent analysis. Superfluous information was removed and relevant information was utilised to develop and articulate appropriate conclusions (Aguinaldo, 2012). Following the transcription of the interviews, the data were examined to evaluate and code the responses separating extraneous information from that which was appropriate to test the theoretical framework. These identified factors were then recorded by way of record sheets in order that such information could be reviewed as necessary during subsequent interpretation. The collected data was analysed for responses and evidence that would be supportive, contra-indicative or neutral in relation to the theoretical framework and its six key factors.

4. RESEARCH RESULTS

Table 1 presents a summary of the research results, linked to the factors in the theoretical framework. The subsequent sub-sections briefly discuss research interview findings relating to each of the six key factors. Results relating to individual interview respondents are referred to as: 'Respondent 1, 2, 3, 4, 5 and 6' to preserve their anonymity.

Table 1: Comparative analysis between theoretical framework factors and research results

Theoretical Framework Factors	Interview Outcomes	Do Outcomes Support the Theoretical Framework?
Appropriate Legal Agreement	The collected evidence provides significant support for this aspect of the model. Examples were identified to justify this aspect within the framework.	Sufficient evidence supports this aspect of the framework.
Sufficiently Developed Technological Application	Technology may in future be essential to alliances, however the evidence collected suggested that technology is currently viewed as a tool to assist rather than as a requirement for success.	Insufficient evidence to support this aspect of the framework.
Satisfaction and Value	Satisfaction has been shown by the evidence as particularly challenging to determine as a factor for success. The social and non-mathematical nature of success is very difficult to validate as a quantified method of proof. The more social nature of satisfaction however can enhance quantitative metrics through the realisation of the benefits of an alliance.	Sufficient evidence supports this aspect of the framework.
Competitive Advantage	Competitive advantages were shown to be varied in a small sample population and cannot be said to be exhaustive. However, this small sample population has shown that the advantages are not necessarily competitive against peers, but can also be advantages against targets such as regulatory frameworks at a level of national legislation.	Sufficient evidence supports this aspect of the framework.
Improved Performance	Improved performance generated significant input from the respondents. They indicated that success would validate the selection of the alliance and was therefore essential to justify a move away from more traditional contracting methods.	Sufficient evidence supports this aspect of the framework.
Offsite Manufacturing	Off-site manufacturing has insufficient evidence to support the success of an alliance. The collected evidence indicated that this may eventually support programmes of works, however none of the respondents agreed that this was required for success. Aspirations do exist to improve this aspect and so this may change in the future; presently it appears that this is not required for success.	Insufficient evidence to support this aspect of the framework.

4.1 Legal considerations

This factor generated strong replies from all respondents and their respective experiences generated considerable reflection. For example, Respondent 1 indicated that inappropriate contractual agreement wording can cause individuals to refrain from contributing in a manner that they deemed to be beneficial to an alliance. In addition confidentiality, or lack thereof, created an atmosphere that prevented innovation being introduced. Respondent 6 further supported this view and highlighted the complexity regarding intellectual property rights and the challenges this introduced. Five out of the six respondents gave clear examples and indications that an appropriate alliance agreement enabled the alliance to function in the most beneficial manner. Examples of inappropriate drafting were felt to hinder the wider alliance

performance and many agreements were suggested to contain phraseology and language designed to provide betterment to a single party, sometimes at the expense of other parties. No respondents offered any evidence to suggest or contradict this widely held viewpoint and this strongly indicates the validity of the inclusion in the framework of this factor. Save for one respondent, all remaining respondents cited examples where they felt an agreement was inappropriately drafted preventing superior performance. With this evidence recorded, it is reasonable to suggest that this factor of the framework was appropriately supported.

4.2 Technological advancements

The results for the interlinking relationship between alliances and technology were, by comparison with other aspects of the framework, considerably less definitive making any judgement more challenging. Of the six respondents, three did not articulate any potential use for technology in creating or enhancing the success of alliances. From these three respondents it can be determined that technology does not contribute to a successful alliance. Two respondents further indicated that technology is simply not desired by client organisations and they are unwilling to integrate technology into their working practices. From all respondents there was no clear evidence that technology is required for a successful alliance. There were some suggestions that technology can and may help an alliance, and some felt the need to offer technological solutions in order to differentiate themselves from the competition. However, no evidence was offered that supported the technological aspect of the framework and separately distinguishing ambition and business development from successful application. Ambition for improvement in technology however does not appear to confirm that technological applications are necessary for success in an alliance environment. Therefore insufficient evidence existed to support this framework factor.

4.3 Satisfaction and value

Respondents provided their opinions as to what they had found satisfying and dissatisfying about their alliancing experiences. Common factors relating to dissatisfaction were mainly centred around behavioural challenges in that individuals did not embrace the concepts of an alliance and were not modifying their own behaviour for this environment. The respondents were nearly unified in declaring such behaviour as detracting from the satisfaction of an alliance. One respondent indicated that satisfaction was loosely linked to the viability of the business case for that particular project. This respondent indicated that the project was probably less likely to continue if satisfaction could not be achieved. Three respondents went further stating that the achievement of satisfaction would validate the business model and lead to its development. Satisfaction was deemed by respondents to change the view on contracting in general and could lead to shaping future outcomes. Positive satisfaction would appear to allow the respondents to justify contracts engagements and behaviour based at least partially on satisfaction which is unusual practice. It would be unsupportable from this research to state that negative satisfaction would mean that an alliance would be unsuccessful. However, it is reasonable to state that positive satisfaction can be linked with a positive and successful alliance. This is supported by the range of responses given that alliances brought considerable innovation and value for money. It is therefore reasonable to suggest that this factor of the framework was appropriately supported.

4.4 Competitive advantage

The data analysed indicated significant dissatisfaction with alliance arrangements overall and some respondents suggested that alliance performance was below expectations. One particular response indicated that the client organisation had become overwhelmed and was attempting to utilise an alliance arrangement in order to overcome most difficulties with contracting arrangements. Similar views were expressed by another respondent in that they were not able to change behaviour to suit the alliance environment and were expecting improvements immediately. The evidence continued that such environments enabled an environment where the various parties can learn from the other parties, creating a greater, and more accurate, flow of information. Another respondent indicated that resources could be captured earlier and took production capacity away from the other market competitors thereby enhancing and distinguishing their offering. The defining of a competitive advantage provides significant scope for a wide variation in answers and industry appears to be developing business models that represent a significant departure from traditional arrangements between a client and a contractor and so forth. One respondent highlighted how the integration of a series of contracting groups provided market testing of a multi-billion pound capital development plan. This plan was reviewed by the industry regulator who approved it based on the alliance validating that the business plan was deliverable. This particular alliance had clear plans to deliver known outcomes and they were clear in their use of the alliance arrangement to do so. Of particular distinction to this example was that the relationship was mutually beneficial to both parties and both received benefits in that: the client organisation's business performance improved, whilst the contractors gained access to areas of the client organisation's business that was not openly available to them previously. From the findings of the research it is reasonable to assert that this test confirmed the importance of the alliance in providing a competitive advantage and therefore this factor's inclusion in the framework was appropriate.

4.5 Improved performance

The interview questions related to improving performance generated significantly varied responses from all respondents. Improving from a relative starting position could influence the outcome and responses by showing that this matter is not relevant. The questions were structured in a manner that broadly followed a project's lifecycle starting at pre-contract phases moving to development phases and concluding with retrospective questions designed to reflect upon experiences. A question regarding prior expectations produced significant responses that indicated that many potential hindrances to performance existed ranging from employing companies restraining performance due to company operation guidelines, to individuals that did not openly embrace change. These responses indicate a general level of experience and frustration by the respondents, yet the responses did not directly support this aspect of the framework. The questions aimed at the later stages of project lifecycle alter this non-confirmatory appearance as responses generally supported improving the alliance performance. Training and induction were identified by all respondents as essential to improving performance. Such training ranged from formal short courses to a personal induction with persons demonstrating how individuals should behave. The evidence suggests that training brings significant improvement to alliances. This apparent misalignment suggests a possible improvement of the general structure and arrangement of alliances. It remains a possibility that these performance improvements are documented yet simply kept hidden from the operatives within a framework. The evidence gathered suggests that success and improvement

are broadly aligned even if the link is less clearly defined and thus supported this factor's inclusion in the framework.

4.6 Offsite manufacturing

From the evidence collected respondents were not entirely in agreement as to what constitutes offsite manufacturing giving support to the variation of definitions surrounding this topic. Some respondents believed material component sub-parts, such as bricks, were offsite manufactured; others viewed items such as fully assembled modular buildings as offsite manufactured components, as these would previously have been built mostly on a site. With this variance of opinion the possible outcomes could have been equally varied and difficult to establish. Respondent 2 gave examples of how a particular alliance was attempting to use offsite manufacturing to enhance their particular offering. The remaining respondents shared a common viewpoint that offsite methods can be utilised to support construction activities, however each respondent identified a particular challenge to implement such methods. Furthermore each respondent gave replies that simply conveyed offsite manufacturing as a potential area of improvement. Respondent 6 had the most clear and unambiguous opinion that alliance arrangements, and off site manufacturing, were two independent topics and have no interlinking effect upon each other. Separating the distinction between aspiration and corroboration of success justifies drawing the conclusion that offsite manufacturing does not appear to be required for an alliance to be successful and therefore this factor's inclusion in the framework was not supported.

5. DISCUSSION AND CONCLUSIONS

The research analysis has shown that two of the original factors in the framework were not supported by the research conducted: offsite manufacturing, and technological advancements. The exclusion of these factors leaves four that were supported by the research. However, two new factors emerged from the interview analysis that were not as strongly present in the literature reviewed. 'Investment in appropriate alliance strategies, including training issues', and 'the control and allocation of risk' were the two new factors identified as important to successful alliances. All six interviewees identified these two factors as key requirements for an alliance to proceed in a productive manner.

Risk in relation to alliance arrangements is not discussed in great detail, as discovered during the literary review phase. Significant literature is available to discuss risk as an isolated topic, however no specific risk research in relation to alliances in construction was identified. For this reason it could not be justified for inclusion into the initial theoretical framework. Research respondents suggested that risk management would be better suited if it was moved into an alliance arena rather than its utilisation by individual organisations. Such a development is broadly in line with research by Mills et al. (2009) who stated that tools can be used to define value at a project's inception. Equally, this could be tested by revalidating the alliance model for a change where appropriate risk management tools were included prior to a project's commencement removing such decisions entirely from the individuals own grasp and resolving such issues in a more open and project level manner.

Significant evidence was provided by the respondents with regard to wide criticism of alliance projects, stating an expectation on the operators of such agreements to simply just work it out.

Complex agreements, lack of training and unfulfilled potential left the respondents questioning the use and capability of alliance agreements. The use of a pre-planned investment strategy could allow an organisation to address the common issues identified by the respondents which could be justified on the basis of optimising returns. However, this would require further validation to engage and refine the potential scope for an investment strategy.

The critical analysis above has supported the inclusion of the following two factors into the revised framework:

1. Operation of a suitable shared risk management system, and
2. An alliance investment strategy.

The revised framework, shown in Figure 2, is therefore the result of appropriate evaluation of both the theoretical and empirical evidence gathered by this research. Furthermore the critical evaluation has supported the proposed revisions to the theoretical framework. Previously in this research the importance of the social dynamics on construction has been contended as often being ignored. Therefore the framework has been revised to reflect the actual experiences of the respondents, relating to alliance projects, where difficulties have arisen. The initial framework was formed in a more technical manner and did not give sufficient consideration to the 'human dynamics' of construction projects.
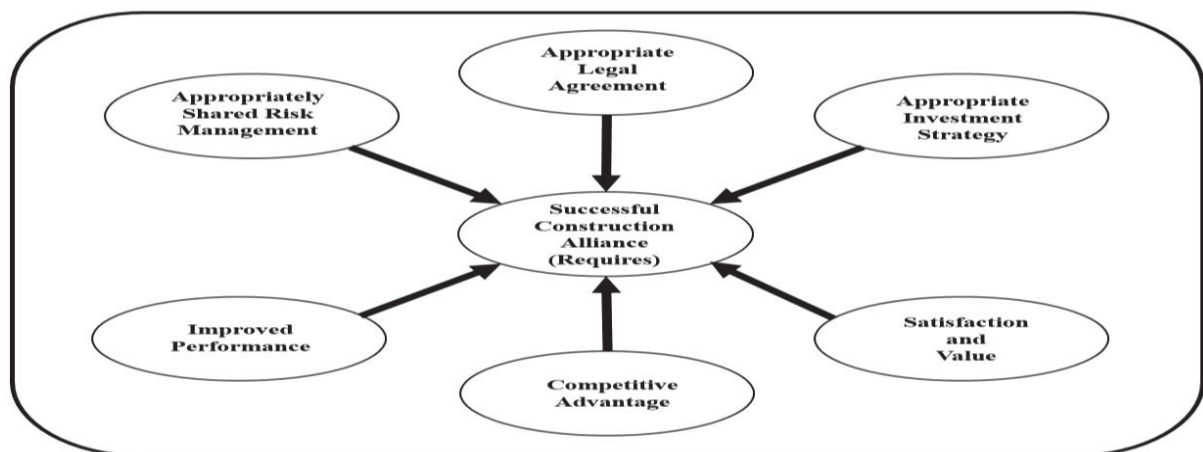

Figure 2: Revised Alliance Framework

Defining an industry standard on what an alliance can be, and equally as important as to what it cannot be, could provide a greater influence than a narrowly focussed piece of research. With an industry standard definition of alliancing, this research could be developed to contribute to the establishment of an industry standard framework for the engagement and operation of alliances. The British Standard Institution's [BSI], BS ISO 44001 (BSI, 2017) has contributed to this in terms of providing more clarity in the definition and understanding of collaborative relationships and this research is seen as contributing to further development of standards, and a greater understanding of alliancing.

Given the small sample size of the research test conducted it is suggested that further empirical research, with a larger sample size, should be conducted in order to validate the revised framework developed from this research investigation.

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