

# Collaboration Impact on The Performance in Construction Projects: Case Study Selangor Malaysia

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**Abstract-** *The study aims to identify the effectiveness of the collaboration and challenges faced by the construction stakeholder in response to the current problem in construction industry. Quantitative study has conducted and using simple random technique to distribute the questionnaire among construction players. Three main construction players consultant, contractors and client has chosen and individual has given 10 samples of the questionnaire due to the time constraint. SPSS analysis has practices for the data analysis process, where data reliability shows satisfactory result. Mainly effectiveness of the study indicated that collaboration has significantly effective in construction project in the following conjunction with impact of collaboration shows very impactful indicated that collaboration is less practice in Malaysian construction industry but respondents believes it has positive impact and effective. Moreover, study found that overall performance of the construction project may improve with collaboration reduce project completion time period but cost will not reduce. Further, it is found lack of effective tools and poor communication among the stakeholders are the major issues which need to address by hiring professional in the industry. In the future context study has to address other challenges and extend the data collection from the other construction players for the better understanding of the problem.*

**Keywords-** Collaboration; Construction Project Performance; case study Selangor

## I. INTRODUCTION

The contribution of construction industries in the pillaring economic growth of any country cannot be avoided and study of Mirawati et al., (2015) postulated that from two decades Malaysian construction industry has contributed 3-5% of the total gross domestic products (GDP) of the country. Economic and socio economic growth of the nature depended and is the initiating growth of the any community where major player is the construction industry (Ali et al., 2010). Since the

contribution of construction industries is vast the majorly facing problem from the years has received criticism over the patterning or collaborations consensus have never been developed among the stakeholders. Mirawati et al., (2015) stated that poor collaborations are due to ineffective communication and lack of trust among the stakeholders of the construction industries and client. In the era of advancement construction industries are suffering collaborations issues all over the world which push the industry in the result negative impact has been noted (Mirawati et al., 2015). Dispute among stakeholder always cause the cost and time overrun in the construction projects (Spang & Riemann, 2014). Confrontational working environment created in the construction industries because of poor cooperation and communication among stake holders which caused the delay in the project till the issued has resolved (Chan et al., 2008).

All government construction related projects has to be completed on time not for the political gain because the government projects is funded with public money so delays in the project will overrun the cost (Mirawati et al., 2015). Memon et al., (2011) divulged that Majlis Amanah Rakyat (MARA) projects are experience often delays in the result poor implementation process has slowed. Mirawati et al., (2015) has quoted star news Malaysia, (2013) and National Housing Department, (2013) published statistics of projects have been abandonment or delayed due to pattering issues are the Malaysia External Trade Development Corporation (MATRADE); Penang second bridge; Sultan Mizan Zainal Abidin Stadium's and Puchong Jaya flyover are the few examples.

The statistics revealed that collaboration has effect on the construction projects are facing serious issues of cost overruns and delays. Several studies have been conducted to study the cost overrun and delays factors but rarely have consider the issue of in effective collaboration problem. The study has found the gap of aforementioned problem of delays and cost overrun caused because of ineffective collaboration among the stakeholders. Sub-contractor plays vital role in the

construction projects which is previously not study so this study has aim to uncover the collaboration impact in the performance of construction projects. The study has aim to investigate the effectiveness of collaboration in construction project followed to examine the performance of collaborations in the construction projects in Selangor Malaysia and to identify the challenges faced by the stakeholder in collaboration process.

## II. LITERATURE REVIEW

It is necessary to understand the meaning of collaboration in construction management as very often heard this term in the business management. According to Matthews, (1999) the concept of partnering in construction industries was presented/started in the United states where multiple companies share their mutual interest in the project and achieved popularity among the construction industries. The United States army corps engineers are the pioneers of the patterning concept in construction industries to gain their mutual interest. The positive outcomes of collaboration has extended to the other countries and adopted in the United Kingdom, South Africa and Japan (Allen et al., 1999). Collaboration is the legal documented relationship establishment between companies or firms to share mutual interest and improve the performance of the project to reduce delays and cost also to maintain or improve the quality of work. Construction industry board (CIB) of United Kingdom has defined partnering or collaboration structural management approach to facilitate team working across contractual boundaries. Furthermore, collaboration in construction projects has been explained by the Construction industry board (CIB) the basic mutual understanding to achieve common goals, understanding of problem resolution approach and measurement to enhance the performance. Bygballé&Ingemansson,(2014) has explained some benefits of collaboration in construction as through proper collaborative process technical solutions and innovations of high quality can be achieved. Other benefits of collaboration includes; reduction of the cost of the project for the project owner; contractors will gain high profits; the projects will be completed early and there will be fewer disputes among the contractors.

### 2.2 Sub-Contractors Role in Collaboration

In the recent years construction work of Malaysia has become much specialized. In this system all the subcontractors no matter how important it is, can contribute different ideas about the construction project in their area of specification (Xu et al., 2014). In a collaborative project of construction, all the team members are allowed to have their ownership and their

rights and responsibilities on the outcome result of the project as all of them are being involved in the process of decision making.

This results in the production of a high quality result with optimum efficiency. However in some cases the subcontractors working in the Malaysian construction industry face some problem as well. They reflect the lack of dependence and trust which delay the system of payments and deteriorates the quality of the performance of those subordinates (Allen et al., 2017). It has been observed that when any problem arises in the completion of the project, the expertise of the subordinates is not been considered as they are being considered as ineffective as well as wasteful rather they have to forcefully accept the decision that has been taken by the higher authority. In order to make a collaboration process successful it is important for the team to design the entire project with a common vision. From the starting of the work which includes the planning of the collaboration up to the implementation of all the plans and executing them the mission should be same. It is necessary for the team members to satisfy the role of a decision maker and to create a healthy working culture for the project so that the difference in the individual culture of all the team members can be suppressed.

### 2.3 Impact of collaboration on the performance of construction projects in Malaysia

The construction industry has been benefited a lot by the collaboration of real time. It is already been discussed that all the projects of construction have a number of hurdles and it is also difficult to track the working of the of all the different groups that is being working for achieving the effective as well as successful result of the project. In order to ensure the effective result of the construction projects most of the companies of construction industries are being involved in the collaboration process. Thus the importance of the collaboration of the organizations is becoming more evident gradually. The increasing tendency of collaboration among the industries of construction is been seen from the last 7 years. In a study that has been recently conducted by the article (Smith et al., 2017) stated that the following impact of collaboration has been observed in all the construction organizations. About 91% of the total owners as well as the conductors agree with the fact that due to the collaboration process and implementing the techniques of collaboration, the risk of failure of any construction projects has been reduced to a significant degree.

According to Smith et al., (2017) study that was conducted on the effect of implementing BIM which is known as the Building information Modeling, it is been observed that

the multiparty communication process has been improved a lot that the previous years and also the supervisors who are responsible for this role are now able to communicate with different parties at the same time effectively. The usage of BIM has also improved the quality of understanding the projects that are done of 3D visualization much more analytically as well as effectively. This has resulted to achieve a consistency in the construction projects that are based on 3D visualization.

This is one of the most highly rated benefit of the use of BIM which makes it an essential tool that is need to be implemented by all the organizations who are entering in a collaboration for the purpose of effective communication among all the parties and other sub-contractors. Another effect of using the collaborative process is to manage the uncertainty of the construction organizations. After a study has been made it is being found that almost 66% of all the architects, contractors as well as the owners agree with the fact that coordination as well as the integration among all the building process as well as the designs has been able to reduce the risk to a significant degree effectively. This has reduced risk of failure as well as uncertainty level during the phase of designing of a construction process (Mayer & Kenter, 2015). However apart from the above mentioned benefits the construction industries also suffers from certain issues due to the collaboration. Most of the industries of construction have to face a significant amount of struggle in order to be collaborative.

The organizations need a very positive attitude in order to make sure that they are being able to overcome the issues and the challenges which they are facing to be collaborative. Among the different causes that arises the risk of uncertainty in an organization of constructions, the architectures feel that the practice of omitting the design is one of them. The impact of omitting designs ager the construction has been started effects the complete project and the success of the project becomes uncertain. The same phenomenon is also being faced by the contractors as well as the owners of the project. The constructors as well as the owners also tend to follow the gap which persists in the perception which is related to the uncertainty of the fundamental causes. For this factor the ability of the organization of construction gets affected in order to implement collaboration effectively. The article Mancini et al., (2017) analyze that the schedule as well as the budget performance gets affected a lot due to the practice of collaboration process. Apart from this in certain cases the quality as well as the performance of the organization is also being affected. It was observed that 61% of the contractors reported that they get a delayed delivery of their project due to the process of collaboration organizations.

This was affected due to the change in schedule of the time as well as the capital that was allocated for that concerned project has also been changed. About 50% of the business owners felt that their projects has been able to be completed within their stated budget even after the organization entered into collaboration. However the other half of the owners complained that after the concerned organization entered into collaboration, the organization failed to complete the project in with the stated budget and the final result of the project was over the budget.

Some other findings have also been observed by the members of the organization which the feel are needed for the improvement of an effective collaborated system. The owners also trend to engage the stakeholders in the process of collaboration at a very early stage. The stakeholders that are been included in this stage are the contractors, the architectures and the designing team as well as the key trades. Most of the owners agreed that they tend to collaborate with the key stakeholders in order to make sure the idea of conceptualization. According to the article Liu et al., (2017) if the stakeholders are being engaged in the collaboration process at a very early stage the it will be possible to make a bridge among the gaps that had been observed between the various sub sectors of the entire project. It can be attained in such a frequent rate that the organization will be able to align all the stakeholders who are involved in the collaboration process with the same mutual goal.

The article Kinnane and West, (2013) discusses that there are many scopes in a construction site where things can go wrong. However this can be reduced to a degree if there is a significantly good relationship of trust among the contractor as well as the architecture. Through this relationship of trust the risk factors that lead to the uncertainty of the construction project can be reduced. Both the constructor as well as the manufactures have an in depth knowledge of the technology of the construction of a building. In the first step of collaboration this manufactures produces their ideas well as knowledge. The architects are greatly benefited by these early planning as well as the blueprint of the systematic steps of the construction process which has been made by the manufacturer and the general contractors. In this step the experience of the contractor which the contractor may have gained from his previous working sites also helps significantly. Using that experience the contractor can find the subtleties that are needed on that particular project site. This would help to have a good impact of the final construction result as well as the nuances and the restrictions that may arise in the generation of local permit can also be avoided.

Through proper collaboration the conductors will also be able to identify the various conditions that may lead to the risk of migration in a long term basis which may result in the poor integrity of the building constructed.

## **2.4 Challenges Faced by engaging the Stakeholders in Malaysia in Collaboration Process**

It is observed through the reports of Malaysia that good performance of the construction projects is not possible to be achieving in isolation. Thus collaboration is needed in all aspects. The practice of collaboration should be implemented across all the boundaries like that of cultural, organizational as well as the professional. With proper collaboration process the problem solving techniques of Malaysian construction Industry can be enhanced, various buy-in processes can be improved. This will lead to the development of many new as well as innovative ideas about partnership. However, there are certain pitfalls in the collaboration process that is practiced by Malaysian industry which have the potential to overshadow the benefits of collaboration. In the process of solving complex issues all the members of the group is needed to be forced up to their comfort zone in order to get the best result. This implies that the all members who are expertise in their own field have to face certain level of uncertainty as they also need to work in those sectors in which they are not expertise when they are working in a collaborative process (Nawi et al., 2014).

### **1.0 2.5 More opportunities are needed to be created for engaging the stakeholders**

The earlier techniques of involving the stakeholders in the collaborative project of construction were expensive. The contractors used to depend upon face-to-face interaction, advertising through the press, publishing questioners through letters and papers as well as consulting with the road show and different other resources. By following these practices the opportunity of engaging with the stakeholders got reduced to a considerable degree. Thus in the restricted scenario, the contractors were able to collaborate with the stakeholders only if there is an availability. However the contractors failed to collaborate with the key stakeholders when the collaboration was truly desirable or would help in the productivity of the construction project.

This challenge is being able to be overcome by using different tools and software that are available for the purpose of collaboration with other organizations (Rahman et al., 2014). These tools such as BIM allow its users and the construction companies to collaborate with other construction organization online. The software like BIM or Kahootz allows

the users to collaborate with the stakeholders in a quick basis as well as in a cheaper rate. Through these software the contractors can inform all the details of the workplace to the stakeholders and also can consult with them, thus the contractors and the subcontractors can collaborate with any stakeholder whichever they chose at any time of the day.

### **2.0 2.6 Travel Cost and Productivity**

It is considered as a major challenge when a construction organization tries to collaborate with its stakeholders. In the very initial step, the construction organizations faces difficulty and needs to do a lot of resource in order to identify their stakeholders. It is a very important factor for the organizations to identify their stakeholders correctly with whom they are needed to collaborate in order to increase the productivity of the construction process. Thus stakeholders are needed to be identified and chosen very carefully. This can be done using different tools of collaboration such as the online BIM software or the Kahootz software. This will make the process of engaging the software more purposeful, comprehensive as well as more effective (Fulford & Standing, 2014). Also if the construction organization can successfully collaborate with the right stakeholders then the productivity of the project proceed by the organization will increase significantly.

### **3.0 2.7 Widening the base of Stakeholder**

The construction companies as well as the conductors finds its challenging collaborate and to bind up with the right stakeholder. According to (Yusof et al., 2016) it is a very expensive as well as a time consuming process. The employees in charge who are responsible for managing the process of collaboration, and need to inform the processing of the work to all the stakeholders of the stakeholder finds it difficult to consult or inform with all the stakeholders involved. They reported that it is possible to communicate and consult with only a limited number of stakeholders as the process of communicating with the stakeholders is time consuming as well as expensive in the case of a face-to-face interaction. However to overcome this challenge, the digital challenge as well as the different online tools of collaboration can be used. This enables the construction organizations to communicate with the stakeholders that are collaborated with the organization in a very short span of time. Apart from the time management, more stakeholders can be consulted with (Yap et al., 2017). Without the use of online tools of collaboration, the conductors and the company of construction had to be restricted up to a limited number of stakeholders which included only the mainstay consultation stakeholders, however with the use of online digital collaboration tools this challenge can be overcome and the organization will be able

to identify many new stakeholders who can come forward themselves.

Furthermore, the organizations find it difficult to reach some of the collaborated stakeholders due to certain reasons (Sim&Putuhena, 2015). Those stakeholders are difficult to be communicated with as they lack the time to attend any meeting fixed by the construction company or they simply feel uncomfortable to attend those meetings and the different sessions which are being arranged by the contractors of the construction project in order to let the stakeholders know about the working status of the project. However with the use of cloud based tools of collaboration it has become simpler to communicate with the stakeholders who are hard to be reached. In addition to the stakeholders who come from the group of young people, or the stakeholders who have disabilities or busy in their life can be communicated easily with the help of digital communication.

#### 4.0 2.8 Transparency and Accountability

Another major challenge that affects the collaboration process with the stakeholders is to maintain the accountability as well as the transparency. The contractor of the construction organization has to use different channels for communicating with the stakeholders and to keep their records. This channel includes email, various social media sites, distributing online questionnaires through different software etc. Thus the organization faces a profound issue to maintain the audit trail as well as the undefined view of the various records of all the transactions that take place in between the stakeholder and the construction organization. To overcome this challenge, the organizations use the digital tool of collaboration which is BIM. It allows the user to use different tools at one place in a single package. Thus all the engagements of the stakeholders are being met in a significant proportion. It also enables the construction organizations of Malaysia to get the complete trails of audit which is taking place in the workplace (Nawi et al., 2014). It also gets expensive for the Malaysian construction organizations to record to record all the audit trails. The process of exporting these records to all of the stakeholders in a collaborative process from the organization is time consuming as well as expensive.

### III. METHODOLOGY

#### 3.1 Research Population:

The study population should be defined accordingly therefore construction industry players are chosen as the population for this study. In construction industry players contractors,

consultants and owner play the key role so the questionnaire is distributed among them. In construction sites engineers and project manager are the representatives; in consulting body various experts represent the construction industry. A simple random data collection approach has been adopted to distribute the questionnaire among the construction player. The professionals were approached by direct sites and office visits to handover the questionnaires. The targeted populations were clients, developers and consultancy to reflect the balance point of view also ensures the data reliability.

#### 5.0 3.2 Sample Size

Since simple random data collection technique was used to approach to the population of the study. Probability sampling technique is used for random sampling and total 30 questionnaires were distributed among contractors, consultants and clients each party has given 10 copies of questionnaires.

### IV. RESULTS AND DISCUSSION

Demographic analysis of the study indicated that 70% male and 30% female participants were filled the questionnaire study and majorities were university graduates. 52% respondents are from contractor background followed by consultant 29.6% and the client 18.5%. Client was found least interested and did not respond to the questionnaire.

Data reliability findings show that effectiveness of collaboration has the slightly lower Cronbach's coefficient value of 0.691. The Cronbach's coefficient value indicating for the variable of performance of collaboration in construction has the highest value 0.806 followed by the challenges faced by the stakeholder in construction industry has Cronbach's coefficient 0.738. Overall the reliability statistics indicated the reliable data as the Cronbach's coefficient in the range.

#### 4.1 The effectiveness of Collaboration in Construction industry

Collaboration effectiveness is measured using descriptive Statistics result is shown in the table 1 where level of collaboration within the Malaysian construction industry has found lower as the mean value 1.48. Where 1 represents the low collaboration among stakeholders, 2 medium collaboration and 3 high level of collaboration. The mean value is lower than 2 and more close to 1.50 indicated the collaboration among Malaysian construction industry is rated medium or poor collaboration among stakeholders. How effective is the collaboration in Malaysian construction industry has obtained mean value 3.074 and standard deviation is 0.873 indicated that respondents claimed collaboration is the

neutral phase in Malaysia. In this case 1 representing strongly effective and 5 strongly not effective and 3 shows the mildly effective so respondents claimed for mildly effective collaboration in Malaysia. Collaboration impact on the success of the project is claimed impactful with mean value of 3.0 and standard deviation is 0.78. In this question respondents were asked to rate the collaboration impact on the construction project where 1 very impactful to 5 highly not impactful.

The rate of success and effect on the project success found mean value 2.14 and Std deviation 0.94 shows the collaboration has slight impact on the construction project success. Direct correlation and project success was rated as mean value 3.0 and std deviation 1.14 indicated the neutral correlation of collaboration in construction project. Study found that collaboration is an effective tool in construction project unfortunately there is lack of understanding and framework in Malaysia.

**Table 1: Effectiveness of collaboration in construction project**

	N	Mean	Std. Deviation
How would you rate the level of collaboration within the Malaysian construction industry	27	1.4815	.70002
How effective is collaboration in the Malaysian construction industry	27	3.0741	.87380
How much impact does collaboration have on the success of construction projects?	27	3.0000	.78446
how would you rate the impact of collaboration on the success of construction projects	27	2.1481	.94883
In your opinion, is there a direct correlation between collaboration and project success	27	3.0000	1.14354
Valid N (listwise)	27		

**6.0 4.2 Performance of Collaboration in construction Project**

The second objective of the study to examine the performance of collaboration in construction project findings is shown in the Table 2. Collaboration affect the performance of construction project has the highest mean indicating that collaboration in construction project improves overall performance of the project. Collaboration improve the performance of overall construction project is ranked on top with mean value 3.44 followed by affecting performance of the construction project. In addition to, collaboration reduce the time duration of the construction project was ranked on third stated mean 3.074 and std deviation 0.8738 indicated collaboration has positive impact on the performance of the construction project. On the other side, construction cost can reduce with collaboration is found disagree among the respondents with mean value of 2.22. Respondents claimed that construction cost cannot reduce with collaboration. Additionally, the communication among stakeholder found not

improves in collaboration as mean value 2.9. The second objective of the study is concluded that overall performance of the construction project can improve and collaboration has positive affect on the performance of construction project. Importantly, construction period can reduce but cost of the project and communication building among stakeholders found not improve in collaboration.

**Table 2: Performance of Collaboration in construction Project**

	N	Mean	Std. Deviation
Collaboration affect the performance of construction projects	27	3.2963	.86890
Collaboration in construction project Improve the overall performance of the project	27	3.4444	.84732
Collaboration reduce the time duration of the construction project	27	3.0741	.87380
Collaboration enhance the communication among stake holders	27	2.9259	.87380
Collaboration reduce the cost of the project	27	2.2222	.75107
Valid N (listwise)	27		

**7.0 4.3 Challenges faced by the stakeholders in Collaboration**

Likert scale seven question was asked each participants to support the third objective as rate and identify the most challenging factors of collaboration faced by the stakeholders. The result is shown in Table 3 indicated about 63% respondents rated lack of an adequate of framework in collaboration is ranked the major challenge in construction industries toward the collaboration. Lack of an effective collaboration tools are rank on second where majority of the respondents followed by the information sharing or clear communication among stakeholder are chose the third mostly faced challenge in the construction collaboration.

**Table 3: challenges faced by the stakeholders in collaboration**

	Frequency	Percent
Lack of a dequate frameworks for collaboration	17	63.0
Lack of tools for effective collaboration	7	25.9
Information hoarding among stakeholders	3	11.1
Total	27	100.0

Table 3 determine the mean and std deviation among the factors caused challenges of collaboration in construction project. Lack of adequate framework for the collaboration

mean 2.7 and std deviation 0.81 shows that respondents refuse and shows disagreement of not having enough framework. They believe have framework is enough and not a challenge in the collaboration process. Collaboration has so many effective tools which has positive and effective result in the process. Respondents ranked top and agree to say that lack of tools for the effective collaboration is the biggest challenge. The mean 3.81 and std deviation 0.81 indicated that lack of effective tools are the biggest challenge in the process of collaboration. As from the literature we learnt that communication or information sharing among the stakeholder are one of the problem and challenging factor, in this study respondents ranked the second biggest challenge is the communication and information sharing among the stakeholders.

The mean value 3.11 and std deviation 0.89 indicated that information hoarding is the one of the challenging factors in the collaboration. Poor communication and information sharing effect and reduce the performance of the construction project. Generally slow process of late response from the stakeholder put waiting the other stakeholder in this way project get effected and might delayed. Respondents were asked the rigid and slow decision making stakeholder is one challenge in the collaboration was ranked disagree most of the respondents are not agree with the statement and mean value 2.88 and std deviation 0.75 shows this is not the key challenge in the process of collaboration process.

In the literature most commonly mentioned challenge is the trust. Respondents were asked to rate lack of openness among stakeholder is rated high shows one challenging factor. Mean value 3.44 and std deviation 0.86 indicated lack of honesty among stakeholders is the challenging factor. Study found that stakeholder's openness is essentially important and lack of honesty in collaboration is considered challenging factor. In the conclusion remarks study found that lack of the effective tools, information/communication among stakeholders and openness are the key challenges stakeholder faces. To resolve such issue adequate framework should have to tabulate so each stakeholder directly or indirectly involved in the collaboration process must have to improve and positively response to the challenge facing in collaboration in construction projects in Malaysia.

**Table 4: Challenges Faced by the Stakeholders**

	N	Mean	Std. Deviation
Lack of adequate frameworks for collaboration	27	2.7407	.81300
Lack of tools for effective collaboration	27	3.8148	.81042
Information hoarding among stakeholders	27	3.1111	.89156
Rigid organizational structure and decision making process	27	2.8889	.75107
Lack of openness among stakeholders	27	3.4444	.86204
Valid N (listwise)	27		

Table 4 determine the mean and std deviation among the factors caused challenges of collaboration in construction project. Lack of adequate framework for the collaboration mean 2.7 and std deviation 0.81 shows that respondents refuse and shows disagreement of not having enough framework. They believe have framework is enough and not a challenge in the collaboration process. Collaboration has so many effective tools which has positive and effective result in the process. Respondents ranked top and agree to say that lack of tools for the effective collaboration is the biggest challenge. The mean 3.81 and std deviation 0.81 indicated that lack of effective tools are the biggest challenge in the process of collaboration. As from the literature we learnt that communication or information sharing among the stakeholder are one of the problem and challenging factor, in this study respondents ranked the second biggest challenge is the communication and information sharing among the stakeholders. The mean value 3.11 and std deviation 0.89 indicated that information hoarding is the one of the challenging factors in the collaboration. Poor communication and information sharing effect and reduce the performance of the construction project. Generally slow process of late response from the stakeholder put waiting the other stakeholder in this way project get effected and might delayed. Respondents were asked the rigid and slow decision making stakeholder is one challenge in the collaboration was ranked disagree most of the respondents are not agree with the statement and mean value 2.88 and std deviation 0.75 shows this is not the key challenge in the process of collaboration process. In the literature most commonly mentioned challenge is the trust. Respondents were asked to rate lack of openness among stakeholder is rated high shows one challenging factor. Mean value 3.44 and std deviation 0.86 indicated lack of honesty among stakeholders is the challenging factor. Study found that stakeholder's openness is essentially important and lack of honesty in collaboration is considered challenging factor. In the conclusion remarks study found that lack of the effective tools, information/communication among stakeholders and openness are the key challenges stakeholder faces. To resolve such issue adequate framework should have to tabulate so each stakeholder directly or indirectly involved in the collaboration process must have to improve and



positively response to the challenge facing in collaboration in construction projects in Malaysia.

## V. DISCUSSION

The study investigated the effectiveness, performance and challenges faced by construction stakeholder in the collaboration. Questionnaire survey was carried out among construction experts mainly stakeholder of contractors, consultants and client in the territory of Selangor where total 30 samples were randomly distributed due to limited time and difficult to access to the population. The findings indicated from the first objective that collaboration has the effective outcome in the construction project. The rate of collaboration from the respondent's point of view is lower in the construction industry but the effectiveness of collaboration ranked and rated higher shows that collaboration is significantly effective in construction industry.

The impact of collaboration on the success of the construction project is claimed very impactful as the respondents rated higher indicated that collaboration has positive impact on the construction project. Also the rate of success and effect of collaboration in the project has significant attachment. Study found the collaboration has significant correlation of collaboration in construction project. Study found that collaboration is an effective tool in construction project unfortunately there is lack of understanding and framework in Malaysia. Collaboration effect on the performance of the construction project indicated higher as the respondent rated and if the poor collaboration will affect the performance of the construction project. Regardless have meaningful collaboration will positive affect on the collaboration.

Overall performance of the construction project can improve as the respondents rated higher in term of several tools the performance shows improve in the collaboration as it is proven from the literature as well. Most of the respondent believes that collaboration can reduce the completion time of the project but regarding the cost and quality shows disagreement. Poor communication of the collaboration team may affect the performance of the construction project but good communication is one of the challenges. The second objective of the study is concluded that overall performance of the construction project can improve and collaboration has positive affect on the performance of construction project. Importantly, construction period can reduce but cost of the project and communication building among stakeholders found not improve in collaboration. Respondents rated lack of an adequate of framework in collaboration is ranked the major challenge in construction industries toward the collaboration.

Lack of an effective collaboration tools are rank on second where majority of the respondents followed by the information sharing or clear communication among stakeholder are chose the third mostly faced challenge in the construction collaboration. As from the literature we learnt that communication or information sharing among the stake holder are one of the problem and challenging factor, in this study respondents ranked the second biggest challenge is the communication and information sharing among the stakeholders.

## VI. CONCLUSION & RECOMMENDATIONS

In the light of literature review one can conclude construction industry is very complex and always face new challenges. Project to project and organization to organization structure and working methods are different also a lot of expertise need from different group of people. The project is not own by single person or firm it is among stakeholders and important stakeholders are client, contractor and consultant further sub-contractors are also become partial stakeholder of the project. Collaboration is always in the interest of each stakeholder and has many benefits besides sharing the work for hiring different. This study aims to overlook the collaboration impact on the performance and find the challenge faced by the stakeholder. Study has concluded that collaboration has positive impact on the success of the project and collaboration is an effective tool in construction project unfortunately there is lack of understanding and framework in Malaysia.

The performance in term of several activities in the construction industry is said to improve by doing collaboration with other experts. Overall performance of the construction project is improved in the collaboration as the performance has direct relation with collaboration and directly affect. Study found that project duration might reduce with meaningful collaboration as it affects the performance. Study concluded that performance in term of cost reduction and communication building among stakeholder is not found to improve in the collaboration.

When collaboration happened between several group and each has their own interest of profit from the on the going project does not reduce the cost might only reduce the time line but on the other side information sharing among stakeholder performance is found slow and has negative impact on the project. Lack of an adequate of framework in collaboration is ranked the major challenge in construction industries toward the collaboration. Lack of an effective collaboration tools are rank on second where majority of the respondents followed by the information sharing or clear



communication among stakeholder are chose the third mostly faced challenge in the construction collaboration. In the conclusion remarks study found that lack of the effective tools, information/communication among stakeholders and openness are the key challenges stakeholder faces. To resolve such issue adequate framework should have to tabulate so each stakeholder directly or indirectly involved in the collaboration process must have to improve and positively response to the challenge facing in collaboration in construction projects in Malaysia.

The study determined the relationship between collaboration and performance tools in the construction project are strongly supported. In the light of the research findings study strongly recommend strong and professional communication network among the stakeholders especially contractors, consultants and clients will enhance the performance of the project. Moreover, challenges such as an adequate effective tools and information sharing may improve by hiring professional team while collaboration process. This study recommends training of the collaboration field managers and development of social policies. In addition, frequent meeting among stakeholder and collaboration team to look into the obtain performance may improve the quality and reduce the duration. Fair allocation of risks and mutual sharing of the benefits of the project should revise in the meetings.

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