

DOMINO EFFECT OF ADVANCE PAYMENT ON PROJECT CASH FLOW AND ORGANISATION PERFORMANCE

Emmanuel Dele Omopariola¹ and Abimbola Olukemi Windapo²

¹ Department of Construction Economics and Management, Snape Building, Upper Campus, University of Cape Town, Rondebosch, 7701, Cape Town, South Africa

² Department of Construction Economics and Management, Snape Building, Upper Campus, University of Cape Town, Rondebosch, 7701, Cape Town, South Africa

The adverse effect of late payment by employers or contractors and consultants is a common phenomenon and a costly problem in the construction industry. This paper examines the domino effect of the advance payment of contractors on project cash flow and company performance. This stems from the view held by scholars that smooth cash flow guarantees the efficient delivery of construction projects and is a basis for developing and maintaining a healthy and competitive construction industry. The study employs a systematic review of extant literature and a quantitative research approach. A questionnaire survey of construction firms listed in Grade 7 to 9 on the Construction Industry Development Board (CIDB) Register of Contractors was conducted to acquire information required to address the research objective. Using this approach, the study first formulated a conceptual framework and hypothesised relationships illustrating the domino effect of the advance payment system (APS) on project cash flow and organisation performance based on literature review. The effect of the advance payment system and relationship between it, project cash flow and organisation performance were evaluated using a structured questionnaire. After that, the data collected were analysed using mean score and t-test. The findings of this study indicated that APS has no effect on project cashflow and performance of organisations and projects, which negates the hypothesised relationships that were identified in the conceptual framework. The study concludes that the use of APS on projects is not widespread among South African contractors, explaining why the effect of APS on cash flow and organisation was non-significant as against the conclusions of past studies.

Keywords: Advance payment, cash flow, domino theory, organisation performance

INTRODUCTION

A reliable payment system facilitates the performance in construction projects. For a construction project to be a success, it must be funded well (Aje *et al.*, 2017). The contractor's success relies upon being able to hand over the construction project when it has been completed because all the payments due for the construction project are paid at the right time (Oke *et al.*, 2013). Researchers in construction management, such as Kenley (2003), Motawa and Kaka (2008), Omopariola and Windapo (2018), have investigated how payment systems impact project and organisation performance.

¹ ompemmm002@myuct.ac.za

Previous research by Omopariola and Windapo (2018), Wong *et al.*, (2006), and Motawa and Kaka (2008) established that the payment systems currently in use include interim payment, advance payment, stage payment, milestone payment and payment on completion. The governing principle underlying these systems is that clients make payments to contractors in different ways.

An example is making payments periodically to contractors as work on site progresses, based on a review of the estimated value of the work carried out by the contractor, known as the interim payment method. The sum of money usually paid to the contractor by the client before the commencement of the work is described as mobilisation and advance payment. Another method is payment made at the time of completion of the project. This means that each of these methods infers different cashflow situations that could be considered in different ways.

According to Odeyinka *et al.*, (2008), project cash flow is said to be the actual movement of cash (money) in and out of a construction company. The generation of project cash flows is vital for client and contractor. Cash flow is key, especially to the project execution period, due to its usage in assessing the working capital requirements, since the difference between project outflows and payments determines the required capital reserves (Lowe, 1997; Maravas and Pantouvakis, 2012). Also, the specification of project finance requirements and the analysis of the value earned by the capital, and the task of conducting a cost-benefit analysis of the project, are all derived from the actual project cash flow (Maravas and Pantouvakis, 2012). In short, the sub-set of cash flow for the construction organisation is the construction project cash flow (Odeyinka and Kaka, 2005). Payment made to suppliers, sub-contractors and direct costs is dependent on cash inflows from the client. These payments follow the different contracts and agreements between the contractor and client, subcontractors and suppliers, as well as a basis if labour and materials are called up for use during the project execution stage (Kenley, 2003; Odeyinka and Kaka, 2005). In conclusion, the progress of a construction project is reliant on its project cash flow, which serves as a key factor that affects construction company's profitability (Hwee and Tong, 2002).

The poor performance of construction projects and organisations in the construction industry is a global phenomenon. The delivery of successful quality projects and the ability to meet client requirements and resolve disputes between stakeholders is often affected by inappropriate payment systems in the construction industry. Danuri *et al.*, (2006) see payment as the main subject of disputes that lead to financial problems among construction stakeholders, resulting in arbitration and litigation. The client's choice of payment systems is not appropriately aligned to the project environment, while previous researchers (Odeyinka and Kaka, 2005) have revealed that contractors have been dissatisfied with the payment systems used, due to the problems they create, as different systems affect their cash flow during the implementation of the construction project. Davis Langdon and Seah Consultancy (2000) posited that construction project payment difficulties have a domino effect on the supply chain of a construction project. The delay in the payment to the contractor by the client will affect the payment due to the subcontractor or supplier, who is bound in a contract with the construction firm (Odeyinka and Kaka, 2005; Egan, 1998). Also, due to the way the construction company supply chain was designed and structured, failure in the flow of cash, such as payment from the employer to the contractor, hinders the effective delivery of the project, resulting in construction firm liquidation (Odeyinka

and Kaka, 2005). This, in turn, would impact the organisation performance of the construction firms.

An effective payment method, adequate cash flow management and a sound financial management approach stimulate performance in construction operations (Arditi *et al.*, 2017; Lowe, 1997). However, researchers have seldom determined the domino effect of advance payment on the project cash flow and construction organisation performance. This study will fill this gap in knowledge. This research examines whether advance payment affects organisation performance, through project cash flows. Thus, the study will present a literature review on domino theory, the effect of advance payment on project cash flow, and construction company performance. Thereafter, it outlines the research methodology used, and presents the findings and conclusion.

Theoretical Framework and Hypothesis Formulation

Theoretical framework

Domino theory has been successfully applied to the field of financial management and construction company performance (Lowe, 1997). The theory states that the failure of a firm is likely to cause another firm to become insolvent (Mutti and Hughes, 2002; Lowe and Moroke, 2010). The domino effect occurs when a client owes the contractor a considerable sum of money and is unable to pay the contractor when payment is due (Langdon and Seah Consultancy, 2003; Lip, 2003; Nicholas, 2005). The contractor's inability to meet up their financial commitment to the sub-contractors will result in the insolvency of both their own company and that of the sub-contractor (Lowe, 1997). Furthermore, as argued by Withanachi and Fernando (2013) and Choil and Kim (2014), when a contractor or client is unable to obtain a credit facility from their financial institution, this could trigger a domino effect and result in poor organisational performance. According to Hughes *et al.*, (1994), when the main contractor transfers risk to their sub-contractors in the process of protecting their interests, this could result in a domino effect on the work of other sub-contractors. Grosse-Ruyken *et al.*, (2011) and Nicholas and Edwards (2003) posited that the domino effect of sub-optimum working capital management results in financial hitches at a lone supplier in the supply chain, and even liquidation. Grosse-Ruyken *et al.*, (2011) concluded that each working capital management decision should reflect each upstream and downstream partner within the supply chain in the construction industry. Consequently, the inadequacy of working capital and the in- and outflow of cash is of concern, as it can, in extreme situations, drive effective and lucrative companies into insolvency (Lowe and Moroke, 2010). Thus, Choil and Kim (2014) propose that an investigation of the management features, (payment systems, financial management strategies, and organisational performance) of a construction company is of importance to its survival.

Hypothesis Formulation

Effects of advance payment on project cash flow

Cash flow problems are recurrent issues with contractors in emerging countries (Talagala, 1997). In respect of this, an important aspect of the relationship between employer and the construction firms is for employers to pay contractors in advance at least once, most commonly at the commencement of a contract (Aje *et al.*, 2017). Consequently, contractors and sub-contractors are paid in advance by clients to support the contractors in initiating and sustaining robust cash flows at one stage of the project contracts or the other (Abeysekera, 2002; Rameezdeen *et al.*, 2006).

Construction projects demand a high quantity of capital for their actualisation (Wang, 1984). According to Jaafari (1996), cash flow is vital to the contractor; any interruption of the payment will affect cash flow and cause the contractor problems in financing other work (Oke *et al.*, 2013). Not to disrupt the progress of construction projects calls for the need to advance capital to the contractor to facilitate payment to sub-contractors, suppliers, and labour. An advance payment offers the contractor an interest-free loan during the early stage of the contract where the greatest strain is placed on a contractor's cash flow (Oke *et al.*, 2013). Besides, providing advance payment to the contractor will make the construction company more effective in meeting the final cost of the project, as well as the final cost and duration required by the client, instead of contractors delaying the project by trying to obtain a loan externally.

Further evidence exists in the research carried out by Berends and Dhillon (2004) that shows how advance payments are made for large engineering works. Talagala (1997) has also described how advance payments are administered in Sri Lanka and China. While Aje *et al.*, (2017) and Jagboro (1998) have also worked on overrun causations under advance payment regimes, and the net present value of payments made in advance for construction materials in Nigeria; these instances underscore the importance of advance payments to the operations of Nigerian construction companies. These studies made advance payment goals clear: Advance payment enables contractors to establish the client's commitment to project finance and cash flow, and clients can commit contractors to appropriate performance.

Ultimately, the client's strategic goal in paying contractors in advance is to anticipate cash needs for resources so that contractors can pay for scarce resources before the prices rise (Aje *et al.*, 2017), and to avoid the accruable costs that could ultimately add to the client's project costs (Spackman, 2002). As a result, advance payment is described as a strategy to lower projects' outturn costs and helps to speed up the progress of work, prevent delay and guarantee the quality of work, to attain efficiency and profitability. Based on this background the first hypothesis (H1) is formulated.

H1: The advance payment system has a significant effect on project cash flow.

Effect of advance payment on organisation performance

Researchers have given several different explanations for advance payments (Aje, *et al.*, 2017; Oke *et al.*, 2013; Motawa and Kaka, 2009). Project finance literature has identified an advance payment system as one of the significant factors that influence project success (Li *et al.*, 2005). Similarly, other significant studies show that advance payment relates to strategic and statutory practices that facilitate project success. Jagboro (1998) highlights that advance payment serves as a strategic value in the Nigerian construction business environment. This is because advance payment made for materials helps to evade the price fluctuation that usually serves as a reason for cost overrun in construction projects. The establishment of client commitment to contractors with project finance aids the prompt performance of the contractor on construction project operations (Aje *et al.*, 2017). However, effective completion of a construction project relies mainly on how valuable advance payment is to different construction projects. In the previous research (see Oke *et al.*, 2013), it was established that advance payment prompts the completion of the construction project within the specified time and enables the contractors to compete more efficiently in the global market. This corroborates the study carried out by Omopariola and Windapo (2018) that advance payment guarantees efficiency and profitability of

project and organisation performance. As such, advance payment to contractors from the client catalyses the successful completion of construction projects by the construction company (Ellis, 1991). This argument leads to the second hypothesis (H2).

H2: The advance payment system has a significant effect on organisation performance.

The conceptual framework of the effect of advance payment on project cash flow and construction organisation performance

Based on the theoretical framework and hypothesised relationships identified in the above section, a conceptual framework is developed. Figure 1 presents a conceptual framework on the effect of advance payment on project cash flow and construction organisation and project performance. Figure 1 shows the domino effects of APS on cash flow, and organisation and project performance. The domino effect of APS on cash flow includes robust and interest-free cashflows, non-disruption of project progress, prompt payment of sub-contractors, suppliers, and labour, and the client's commitment to project finance. The framework also shows that APS influences organisational and project performance indirectly and mediated by cash flow. Organisation and project performance are measured by evasion of price fluctuation, timely completion of the project, organisational efficiency, and improved profitability of organisations.

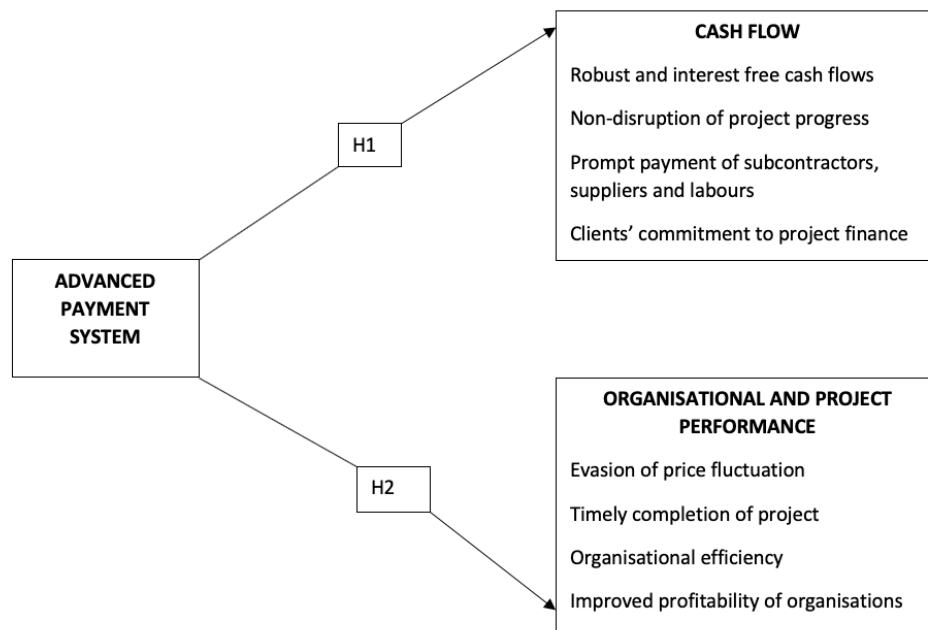


Figure 1: Framework of the effect of advance payment system (APS) on project cash flow and construction organisations and project performance

RESEARCH METHODS

The study is a part of an on-going PhD research. The study formulated a framework illustrating the domino effect of the advance payment system on project cash flow and organisation performance based on literature review. The effect and relationship between the advance payment system and project cash flow and organisation performance were evaluated using a structured questionnaire. The questionnaire was designed to elicit information, such as level of advance payment system used, project cash flow and organisation performance in use, from the respondents. Survey

Monkey was used to administer the questionnaires to respondents. The respondents were selected using a random sampling technique identifying every 2nd respondent on the sample frame. Therefore, each contractor listed on the Register of Contractors had an equal opportunity of being selected. The population for this study includes all 504 contractors listed in Grade 7 to 9 on the CIDB Register of Contractors in South Africa. The survey was sent to 50% of the population of contractors equating to a sample size of 252. As at April 24, 2019, 47 responses were received, which is a response rate of 18.65%. The analysis was based on the responses provided by 47 contractors.

The data collected from the respondents were analysed using percentage distribution, mean score, and t-test. Percentage distribution was used to analyse the extent of usage of the advanced payment system (APS). T-test for two independent means was used to determine the significance of the relationship between the advance payment system and organisation performance. The limitation of the study is that it is a preliminary study from an on-going PhD research. This will have an implication on the findings and conclusions of the study.

RESULTS AND DISCUSSION

Profile of respondents

The responses of 47 respondents from an ongoing PhD research work were used to validate the relationship identified in the framework. The analysis of the respondents' profile shows that 53.19% of the respondents have a bachelor's degree, 25.53% have a higher diploma, 12.77% have a certificate, and 8.51% have N4-6/NTC Certificate. For the designation of respondents, 70.21% of the respondents are in the director cadre, 25.53% are in the management cadre, and 6.38% indicated other designation. Only 29.05% of the respondents are Grade 7 contractors, 25.23% are Grade 8 contractors, while most of the respondents (45.72%) are Grade 9 contractors. For the class of work, 47.57% of the respondents are general building contractors, 47.43% of the respondents are civil engineering contractors, and 5.00% of the respondents are both general building and civil engineering contractors. The results show that the respondents have requisite formal knowledge, adequate to provide informed responses to the survey questions owing to their level of educational qualifications and experience. This was suitable for the research because it will enhance the validity or the dependability of data and subsequent findings.

Test of Hypothesis One

This sought to ascertain whether the advance payment system has a significant effect on project cash flows.

H1: The advance payment system has a significant effect on project cashflow.

An independent-samples t-test was conducted to test the significance of the effect of APS on project cash flow. The result shows that the effect of APS on project cash flow is not significant at $P < 0.05$ [$M1 = 1.55$; $M2 = 3.62$; $t\text{-value} = -0.033$; $p\text{-value} = 0.488$]. This result suggests that the respondents seldom make use of APS on their projects and this has resulted in its lack of significant impact on their cash flow. This finding contradicts the studies by Jaafari (1996) and Oke *et al.*, (2013), which indicated that APS effectively impacts project cash flow.

Table 1: T-value for the effect of Advance Payment System (APS) on project cash flow

Variables	Mean	T-Value	P-Value
Advance payment system	1.55	-0.033	0.488
Project cash flow	3.62		

Test of Hypothesis Two

This sought to ascertain whether the advance payment system has a significant effect on organisation and project performance.

H2: Advance payment system has a significant effect on organisation and project performance.

The result of the t-test shows that APS has no significant effect on organisation and project performance at $p < 0.05$ [$M1=1.55$; $M2= 4.28$; $t\text{-value}=-0.0431$; $p\text{-value}=0.484$]. Specifically, the results indicated an occasional usage of APS among the respondents; hence organisation and project performance have not been impacted by APS. The finding of this study does not corroborate with the study of Ellis (1991), which reported that advance payment to contractors from the client is a catalyst for successful construction project delivery in a construction company.

Table 2: T-value for the effect of advance payment system (APS) on project and organisation performance

Variables	Mean	T-Value	P-Value
Advance payment system	1.55	-0.0431	0.484
Organisation and project performance	4.28		

DISCUSSION

The findings of this study indicated that APS has no effect on project cash flow and performance of organisations and projects. This contradicts the conclusions of studies such as Berends and Dhillon (2004), Aje *et al.*, (2017), Omopariola and Windapo (2018), and Oke *et al.*, (2013), which indicated that APS has a significant effect on organisation performance and cash flow of contractors. The result suggests that the use of APS among South African contractors is not widespread. This could be responsible for the non-significant effect of the APS on cash flow and organisation performance as found in this study. The domino effect of the use of APS on cash flow and organisation and project performance has been identified to include timely completion of project, non-disruption of project progress, improved profitability, and organisational efficiency (Li *et al.*, 2005; Motawa and Kaka, 2009; Spackman, 2002). Following this argument, the non-use of APS among the contractors could also have negative domino effects such as project delay, inefficiency of contractors, and project cost overrun (Rameezdeen *et al.*, 2006; Baloyi and Bekker, 2011). For example, Rameezdeen *et al.*, (2006) posit that non-availability of advance payment will make contractors' overdraft requirements tend to be much higher and turn the net cash flow to negative, thereby resulting in working capital deficiencies. The explanation from this is that working capital represents the liquid or near-liquid assets to lubricate the daily transactions of the project, and any discrepancy between current assets and current liabilities will affect the continuous flow of work on the construction site. Similarly, Oke *et al.*, (2013) concluded that non-availability of advance payment to contractors leads to delay in construction projects delivery, thereby increasing the total

cost of construction projects. Rameezdeen *et al.*, (2006) argued that this will result in contractors not being able to compete more effectively in the global market.

A study by Baloyi and Bekker (2011) on the causes of construction cost and time overruns of the 2010 FIFA World Cup stadiums in South Africa indicates the increase in the cost of material, inaccuracy of material estimates, and the shortage of skilled labour as the major causes of cost and time overrun. Given the positive domino effects of APS, the use of APS might have enabled the contractors to plan their budgets in advance and stabilise their cash flows, and, as a result, save time and cost on the projects (Schulz *et al.*, 2015).

CONCLUSION

This study examines the effect of APS on cash flow and organisation performance. The domino effect of APS on cash flow and performance of projects and organisations was explained in two parts. The first part indicated the effect of APS on cash flow, while the second part indicated the indirect effect of APS on the project and organisational performance mediated by cash flow. The effect was described as a domino effect in this study (see Figure 1). The validation of the domino effect of APS on cash flow and organisational and project performance, using the results from an ongoing PhD research, indicate that the effect of APS on project cash flow and organisation performance is not significant. The study concludes that the use of APS on projects is not widespread among the South African contractors, explaining why the effect of APS on cash flow and organisation was non-significant as against the conclusions of the past studies. This study linked the non-use of APS to cost and time overrun and poor performance of contractors in South Africa. However, the conclusions of this study must be interpreted with caution because the findings from this study were based on preliminary results from an on-going PhD research. The future direction for this ongoing PhD thesis will investigate whether there is a relationship between payment systems used on construction projects, financial management strategies and construction organisation and project performance.

ACKNOWLEDGEMENTS

The financial support of the University of Cape Town (UCT), the National Research Foundation (NRF) and TETFUND regarding this study are hereby acknowledged. The concepts articulated, and inferences arrived at, are those of the authors and are not really to be attributed to UCT, NRF or TETFUND.

REFERENCES

- Abeyssekera, V (2002) Reengineering payment procedures: An agenda for client financed construction *In: S T Ng, S Cheung, K Lam and S Poon (Eds) Re-Engineering Construction: Enabling and Motivating Excellence* Hong Kong: Professional Publication Ltd, , 79-85.
- Aje, O I Olatunji, O A and Olalusi, O A (2017) Overrun causations under advance payment regimes, *Built Environment Project and Asset Management*, 7(1), 86 - 98.
- Arditi, D Koksal, A and Kale, S (2000) Business failures in the construction industry, *Journal of Engineering, Construction and Architectural Management*, 7(2), 120-132.
- Baloyi, L and Bekker, M (2011) *Causes of Construction Cost and Time Overruns: the 2010 FIFA World Cup Stadia in South Africa*. Available from <https://www.ajol.info/index.php/actas/article/view/77173> [Accessed 24th May 2019]

- Berends, T and Dhillon, J (2004) An analysis of contract cost phasing on engineering and construction projects, *The Engineering Economist*, 49(4), 327-337.
- Choil, I and Kim, J (2014) An analysis of the characteristics of financial condition change of Korean construction companies: Using KMV model, *E3 Journal of Business Management and Economics*, 5(1),17-25.
- Danuri, M M Munaaim, M C Rahman, H A and Hanid, M (2006) Late and non-payment issues in the Malaysian construction industry: Contractor's perspective *In: International Conference on Construction, Culture, Innovation and Management (CCIM)*, 26-29 November 2006, Dubai, United Arab Emirates.
- Egan, J (1998) *Rethinking Construction*, London: DETR.
- Ellis, C M (1991) Advance payment and project duration performance, *Australian Institute of Quantity Surveyors Journal*, 3(2),17-21.
- Grosse-Ruyken, P T Wagner, S M and Jönke, R (2011) What is the right cash conversion cycle for your supply chain? *International Journal of Services and Operations Management*, 10, 13-24.
- Hughes, W Gray, C and Murdoch, J (1994) Construction subcontracts: For what we are about to receive risk, management and procurement in construction, *In: 7th Annual Construction Law Conference, Risk, Management and Procurement in Construction*, September 1994, Centre for Construction Law and Management, King's College London, 413-442.
- Hwee, N G and Tiong, R L K (2002) Model on cashflow forecasting and risk analysis for contracting firms, *International Journal of Project Management*, 20(1), 351-363.
- Jaafari, A (1996) Twining time and cost incentive-based contracts, *Management in Engineering*, 3(7),4-7.
- Jagboro, G O (1998) The effect of payment for advance purchase of building materials on contractor's cash-flow projections, *Journal of Financial Management of Property and Construction*, 3(3), 71-83.
- Kenley, R (2003) *Financing Construction: Cash Flows and Cash Farming*. London: Routledge.
- Li, B Akintoye, A Edwards, P J and Hardcastle, C (2005) Critical success factors for PPP/PFI projects in the UK construction industry, *Construction Management and Economics*, 23(5), 459-471.
- Lip, E (2005) *Construction Payment Blues -Why That Domino Effect?* Davis Langdon and Seah Consultancy: Executive Summaries for the Practitioner, 3, 1-4.
- Lowe, J G (1997) Insolvency in the UK construction industry, *Journal of Financial Management of Property and Construction*, 2(1), 83-107.
- Lowe, J G and Moroke, E (2010) Insolvency in the UK construction sector. *In: Egbu, C (Ed.), Proceedings of the 26th Annual ARCOM Conference*, 6-8 September 2010, Leeds, UK. Association of Researchers in Construction Management, Vol. 1, 93-100.
- Maravas, A and Pantouvakis, J P (2012) Project cash flow analysis in the presence of uncertainty in activity duration and cost, *International Journal of Project Management*, 30(3), 374-384.
- Motawa, I and Kaka, A (2009) Modelling payment mechanisms for supply chain in construction. *Engineering Construction and Architectural Management*, 16(4), 325-336.

- Mutti, C D N and Hughes, W (2002) Cash flow management in construction firms, *In: Greenwood, D (Ed.), Proceedings of the 18th Annual ARCOM Conference*, 2-4 September 2002, University of Northumbria, Association of Researchers in Construction Management, 23-32.
- Nicholas, N (2005) *Late Payment Culture Creates Domino Effect*. Accountancy Agency, 30 June 2005 <http://www.vnunet.com/articles/print/2139274> [Accessed 25th November 2018]
- Odeyinka, H A and Kaka, A (2005) An evaluation of contractors' satisfaction with payment terms influencing construction cash flow, *Journal of Financial Management of Property and Construction*, 10(3), 171-180.
- Odeyinka, H A Lowe, J and Kaka, A (2008) An evaluation of risk factors impacting construction cashflow forecast, *Journal of Financial Management of Property and Construction*, 13(1), 5-17.
- Oke, A E, Ogunsemi, D R, Aje, I O and Morakinyo, G A (2013) Performance of advance payment bond in construction projects, *In: 1st NIQS Annual Research Conference*, 3-5 September, Shehu Musa Yar'Adua Centre, Abuja, Nigeria, 478-486.
- Omopariola, E D and Windapo, A O (2018) Impact of payment systems on construction project and organization performance, *In: Proceedings of 42nd AUBEA Conference*, 26-28th September, Singapore, Australasian Universities Building Education Association (AUBEA).
- Rameezdeen, R Palliyaguru, R S and Amaratunga, D (2006) Financing contractors in developing countries: impact of mobilisation advance payment, *In: G Aouad, M Kagioglou, K Harris, H de Ridder, R Vrijhoef and C van den Broek (Eds), 3rd International SCRI Research Symposium*, Delft University, Conseil International du Bâtiment, Rotterdam, 153-165.
- Schulz, F Schlereth, C Mazar, N and Skiera, B (2015) Advance payment systems: paying too much today and being satisfied tomorrow, *International Journal of Research in Marketing*, 32(1), 238-250.
- Spackman, M (2002) Public-Private Partnerships: lessons from the British approach, *Economic Systems*, 26(3), 283-301.
- Talagala, S J (1997) *Evaluation of Advance Payment Systems*, MSc dissertation, Department of Civil Engineering, University of Moratuwa, Katubedda.
- Wang, G Dou, W Zhu, W and Zhou, N (2015) The effects of firm capabilities on external collaboration and performance: The moderating role of market turbulence, *Journal of Business Research*, 68, 1928-1936.
- Withanachi, U T and Fernando, N G (2013) Overcoming sustainability issues through financial risk management in Private Financial Initiative projects. *In: The Second World Construction Symposium 2013, Socio-Economic Sustainability in Construction*, 14-15 June 2013, Colombo, Sri Lanka.
- Wong, C Kaka, A P Fortune, C and Langford, D (2006) A multi-criteria decision-making framework for alternative payment systems using AHP analysis, *Journal of Construction Engineering Management*, 130(5), 691-698.