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Late payment to subcontractors in the construction industry

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Abstract

Late payment is a recurring issue in the UK construction industry. Whilst the existence of the problem is well known, there is a dearth of quantified evidence on the extent of the problem from a subcontractor point of view. This research sought to quantify the extent of late payment and late release of retention and their effects on construction subcontractors in the UK. A research design including the analysis of payment data of 30 selected projects (355 payments) from a case study subcontractor and a supplementary questionnaire survey with 21 subcontractors were used to investigate the issues. Late payment was observed in most of the case study subcontract projects (77%) and nearly half of the payments (46%), suggesting it is common practice. Statistical analysis showed that whilst there was no statistically significant link between payment delay and contract sum, subcontractors are likely to experience longer payment delays in projects with a higher number of payments. It was found that the

late release of the second half of the retention posed an even significant problem to subcontractors, with a considerable portion of the income (upwards of 2.5%); sometimes the entire profit, being held up for nearly two months from the due date. The findings highlight that whilst the regulatory and contractual measures over time have sought to address the issue of late payment, it remains a prevalent issue and that subcontractors often fail to rely on such measures. This necessitates subcontractors to factor late payment into their cash flow planning. The authors suggest that the recent and proposed initiatives such as the Project Bank Accounts, central retention deposit scheme, smart contracts offer potential to mitigate payment delays.

Practical Applications

This research investigated the nature of payment delays from main contractors to sub-contractors within the construction industry. Whilst numerous initiatives have been undertaken, late payments to sub-contractors is still a recurrent phenomenon and a norm in UK construction projects. These include significant delays in releasing the payments retained by the main contractor (money held as a means to encourage correcting any snags of sub-contractors' work) that need to be released when the work is complete. Current standard formal contractual provisions (such as interest payments for delayed payments or agreed payment dates) between the main contractors and sub-contractors does not seem to have shown a significant impact on reducing payment delays. Whilst the Construction Act in the UK has provided some encouraging regulations, they are less observed during the administration of individual contracts between the main contractors and sub-contractors. The findings provide much needed quantified evidence of payment practices that can be reflected in developing regulatory, contractual and administrative countermeasures in the UK and beyond. The information will also enable SME subcontractors to plan for the cash flow problems they could encounter due to late payments. Further external finance handling mechanism enforced through legislation (such as project bank accounts) could be more effective in supporting sub-contractors cash flow and financial resilience.

Introduction

In construction, a supply chain consisting of many subcontractors employed by the main contractor delivering projects is common, resulting in a complex network of contracts between the subcontractors and their main contractors at multiple levels (Eke et al, 2019). Subcontractors rely on their main contractors for work and in today's competitive construction industry, subcontractors face an uphill battle to succeed. The ever-growing competitiveness of the market is squeezing profit margins, and maintaining a positive cash flow is a must to ensure business survival. Subcontractors facing issues with receiving money, either late interim payments or late release of retentions, put their cash flow under considerable strain. Late payment is the delay between the supply of labour, plant or materials and receiving the payment later than the agreed contract payment dates. Whilst late payment remains a significant concern in the construction industry (European Commission 2020), subcontractors are the ones most subjected to late payment. It is a key source of disputes between subcontractors and main contractors (Enhassi et al. 2012). A study by Bibby Financial Services (2016) showed that construction subcontractors in the UK view late payment as the most significant threat to them, with 27% claiming it as their most significant concern. The concern is real in the current market as it is not unusual for companies to end up in insolvency due to simple cash flow problems, as it became evident in the collapses of Carillion and Interserve in recent years (Bounds, 2018).

Many attempts to rectify the issue of late payment have been made previously by the UK government. For example, after the Latham Report (Latham, 1994), the Housing Grants, Construction and Regeneration Act 1996 (HGCRA), more commonly known as the 'Construction Act', was introduced with initiatives to ensure prompt payment throughout the supply chain. These included initiatives such as periodic payments, a final date for payment, the ability to suspend work for non-payment, the ability for a contractor to issue a payment notice if a payment certificate is not issued by the client etc to enhance security of payment. The act was then revised in 2009 (Construction Act 2009) with payment clauses tightened further with measures such as banning 'pay when certified' provisions, the ability to suspend all or any of the works for non-payment, etc. More recently, initiatives such as Project Bank Accounts

(PBA) have been introduced (Cabinet Office, 2012). Whilst some of the initiatives have gained traction, some have failed. For example, Constructing Excellence (2016) noted the Construction Supply Chain Payment Charter launched in 2014 has only gained 10 industry signatories in its first two years. Based on such evidence, Construction Excellence (2016) concluded that numerous payment initiatives, including charters, codes, regulations, etc., have failed to solve the problem.

Cash flow problems faced by construction subcontractors due to late payment is affected by and exaggerated by the problem of cash retention. Retention is a 'sum, generally deducted at each monthly payment notice, to provide the client with some security that the contractor/sub-contractor will return to correct any defects during the defects correction period, or defects liability period' (RICS, 2012; p3). Retention is kept to deal with in case of contractor insolvency and to rectify any later identified defects of the completed work (Hughes et al., 2000). In a standard construction contract, half of the retention is released at the practical completion of the project, whilst the other half is released at the end of the defect rectification period. Cash retention, first introduced into the construction industry as early as the nineteenth century (Champion 2005), is still a mainstay within construction contracts in the UK and applies to most supply chains. Retention, in theory, is intended to promote efficiency and quality of work and allow protection to the clients for defective works until the end of the defects liability period set out within the contract. However, they also cause significant cash flow problems to subcontractors. A key concern for subcontractors is that the holding of retention is not used for its intended purpose. It is reported that main contractors hold onto retention to improve their cash flow to the sub-contractors' detriment (ICE 2018). As noted by the Institution of Civil Engineers (ICE 2018), Tier 1 contractors tend to hold on to retentions from their sub-contracts to protect their modest profit margins. This places an unfair strain on sub-contractors and their cash flow and requires them to waste resources chasing down payment (Wilkinson 2019). In the recent example of Carillion's insolvency in 2018, it was estimated that the company may have owed subcontractors up to £1bn in unpaid retentions (Building 2018). Recognising the gravity of the late and non-payment of retentions, the UK government undertook a major review of retention payments in the construction industry. While the consultation uncovered good payment practices, payment abuse was noted as very common and rarely challenged (BEIS 2020).

Although the broader industry perspective is well known, there is a dearth of information on subcontractors' issues, especially from their viewpoint. For example, Chalker and Loosemore (2016) pointed to the limited research on subcontractors' perspectives. They described it as a 'major omission' given that the subcontractors employ a substantial portion of the construction workforce. In addressing this research gap, the main aim of this research was to investigate the extent of late payment and late release of retention and their effects on construction subcontractors in the UK. To gain further insights into the nature of the late payment issues, this research further investigated if there is a link between the size of the project (project value and project duration) and the extent of payment delay.

Payment delays affecting construction subcontractors

Delays in payment to subcontractors by the main contractor and client are considered a significant concern in the construction industry (Enshassi and Abuhamra 2015, Haron and Arazmi 2020). It significantly affects the cash flows of subcontractors and contributes to a high rate of insolvency. Subcontractor payment delays are discussed under two topics here: late interim payments and the late release of retentions.

Late interim payments

Late payment has long been a concern in the construction industry with those lower down the supply chain often most severely affected. The impact of late payment in some cases could be hugely detrimental to a subcontractor's chances of surviving. A survey conducted on behalf of the Federation of Small Businesses found that 51% of its members had been paid later than the agreed date by large businesses (Integrity Software 2014). An article on the collapse of Carillion states that in their final years, they had stretched payment terms up to 120 days (Plimmer 2018). For subcontractors with significantly fewer resources, this level of payment terms is unsustainable. It also states that the demise of Carillion has made the government and industry bodies take note of this problem. Looking at current research, the extent of late payments to subcontractors ranges widely. Hooks (2017) states that the average time

for a subcontractor to receive payment is 107 days. Only 5% receiving payments within 0 days. However, Bounds (2018) reports that 29% of contractors pay subcontractors within 30 days.

One of the first significant reports to identify poor payment practices in the UK was the Banwell Report 1964 (Griffiths et al. 2017). In his report, Banwell (1964) noted that "*payments to the main contractor by the clients are often slow and uneven, with consequential delays in payments to suppliers and subcontractors*". Latham (1994) and Egan (1998) came after three decades, reiterate similar concerns. Latham (1994) outlined that subcontractors are at the mercy of the payment practices adopted by clients and contractors. As a result of this, the UK government recognised the poor practices in the industry and introduced Part II of the Housing, Construction and Regeneration Act 1996 (HGCRA). In 2004 Sir Michael Latham was again employed by the UK government to review the HGCRA, which later became known as the Latham Review. Latham (2004) noted that although the HGCRA brought established rules and procedures to the industry and the idea to improve payment practices, there were still issues that could be exploited without breaking any of the rules and offered a list of recommendations on tackling payment problems that affected subcontractors. This act also facilitates the security of payment provision by allowing defaults in late payments to be referred to adjudication (Munaaim, 2010). Following these recommendations, the Local Democracy, Economic Development and Construction Act 2009 (LDEDCA) was introduced, which came into effect in October 2011. It aimed to close some of the prominent loopholes that have been identified in its predecessor.

The main aim of the LDEDCA was to increase the security of payment within construction contracts, including the clarity and certainty of payment, introduce a fairer payment regime and improve rights for contractors in the event of non-payment, giving them the right to suspend works and finally to make adjudication more accessible to resolve disputes (Out-Law, 2017). One of the main elements for subcontractors in the LDEDCA was that it essentially banned any form of 'pay when certified' clauses, meaning that subcontractors would be paid regardless of the payment between client and main contractor (Brand and Uher 2010, Tran and Carmichael 2012). Although the addition of these rules in the industry was good news for subcontractors, they feel a reluctance to enforce the rules in fear of missing

out on future works (Yoke-Lian et al. 2012). In addition to this, subcontractors feel the need to accept the terms of the main contractors or risk losing out on work (Bibby Financial Services 2016).

With the industry's competitiveness in general, profit margins are low, and the contracts are lengthy. According to Mullooly (2017), firms are seeking to hold onto capital where possible. Although 'paid when certified' clauses are now banned in the UK, there are still many cases of contractors delaying payment to subcontractors (Cavaleri et al. 2012, Griffiths et al. 2017, Mullooly 2017). Munaaim (2012) states that the LDEDCA missed the opportunity to tackle the late subcontractor payment issue. Due to current regulations, contractors can still delay payments to subcontractors. Munaaim (2012) states that larger companies are the main culprit and that their increased resources and expertise allow them to go unchallenged by subcontractors generally. Ansah (2011), however, refutes that clients and main contractors are the sole reason for late subcontractor payment, stating that the subcontractor is often responsible. The reasons behind this can be incorrect claims, inadequate information to back up claims and even claiming using the wrong contract mechanism. Akinsiku and Ajayi (2016) confirm this by research stating that one of the main reasons for late payment to subcontractors is the failure to agree with the valuations. Research carried out by Ansah (2011) also highlighted a different cause of late payment, poor quality of work. These findings suggest that there are many reasons why the subcontractors may not be paid on time, in addition to deliberate delaying tactics by the main contractors.

The late release of retention

Retention within the construction industry has long been a problem for subcontractors. Retention in a construction contract can be defined according to Cotterill (2017) as an amount that is held back from a payment under a construction contract usually set at 5%. However, Hughes et al (2000) found that the average retention was 3%, with a range being apparent from 1% up to 15%. Within the standard form of construction contracts (As defined by JCT (2022), a standard form of contract is 'a form of contract containing conditions which are applicable, or can be made applicable by the use of alternatives, to a wide range of building projects'), it is common practice that 50% of the held retention will be released

upon practical completion of the works. The other 50% is held until after the defect liability period stated in the contract has passed and all defects are rectified. The purpose of the retention in construction contracts is meant to ensure that the contractor or sub-contractor will return to rectify any defective works during the defect liability period. If the contractor refuses and does not want to return, the retention monies are available to the employer as a contingency to allow the employment of another contractor to fix the defective works (RICS, 2012). Newman (1992) states that the most significant contributor to insolvencies in the construction industry is holding retention monies longer than the justified period. They were backed up by Pye Tait Consulting (2017) as it was discovered that the delay in the release of retention monies ranked number 1 in a 2017 survey for the challenges relating to retention release.

By far, it is the subcontractor that suffers the most from retention practices (NBS 2016). A recent subcontractor survey found that approximately one-third of most subcontractors' retention money for past projects was still outstanding and long overdue (NBS 2016). Assuming a typical retention percentage of 5% and a rectification period of 12 months, main contractors may retain up to around 2.5% of the subcontractor's turnover for a year or more after a project has reached practical completion. Raina and Tookey (2013) state that clients tended to abuse the process and frequently delay the release of retention as much as possible. Similarly, Abeysekera and Wedawatta (2008) also state that retentions are rarely held as insurance against unresolved defects. Generally, the trades that carry out works at the start of a contract could be penalised by retention more as the defect period may commence on practical completion of the main contract works, not the subcontract works. CECA (2018) believe that cash retention is an issue and impacts all parties within the supply chain. Whilst the standard form contracts such as the JCT (Joint Contracts Tribunal) and NEC (New Engineering Contract) allow retention monies to be replaced by a retention bond, the use of such alternatives is not commonplace, especially in subcontracts. Minimising the retention amount to a more realistic percentage that closely reflects the likely extent of defective work or replacing such deductions with initiatives such as a retention bond would allow the subcontractors to have more capital to allocate and resource other projects.

Research has also shown that sub-contractors are the worst affected when retention monies are unpaid (Degerholm, 2012; Steeman, 2013). Degerholm (2012) and Steeman (2013) both believe that this is due to the knowledge of the employees within subcontractors not having the correct knowledge contractually. Therefore, retention monies remain unpaid for considerable amounts of time. Pye Tait Consulting (2017) looks at the main reasons for retention monies being unpaid and indicates that the main causes are sub-contractors not returning to rectify defects within the correct period, insolvency of main contractors/sub-contractors, disputes surrounding defects or that simply the sub-contractor did not ask for retentions to be paid. This suggests that the subcontractors themselves may have been culpable here, at least to a certain extent. Pye Tait Consulting (2017) also found that sometimes a deal is brokered when all the retention monies are not released to maintain the commercial relationship and move on to the next contract. Whilst such arrangements facilitate future work, the total amount due for a project is not received by subcontractors.

Mitigation strategies from a subcontractor point of view

This section identifies mitigating strategies that can help overcome the challenges that often lead to sub contractors' payment delays. Mitigating strategies are classified based on Ramachandra's (2013) categorisation, namely legislative, contractual and administrative.

Legislative mitigation methods arrive in the form of initiatives such as the updated construction act (LDEDC Act 2009) banning pay when certified clauses, which seek to protect subcontractors and the rest of the supply chain from non or late payment. However, according to Sinden et al. (2012), Small and Medium-sized Enterprises (SMEs) in construction confirmed that clients and main contractors still do not comply and still adopt pay when certified tactics. In contrast, Yule (2016) suggests that SMEs exploit this by attempting smash and grab adjudications where employers do not issue notices on time. Legislative measures seem to be the most commonly relied upon to address payment issues. The Construction Act 2009 and other legislative measures discussed previously are examples of these. Although not covered in this research, retention monies also risk non-payment if the main contractor goes bankrupt. There seems to be a case for the regulations to be tightened here. A bill was introduced to the UK parliament in

January 2018 by Peter Aldous MP (who was a former chartered surveyor) as a private member's bill to necessitate retention monies to be deposited in a retention deposit scheme – similar to that of a tenancy deposit. However, this bill, the Construction (Retention Deposit Schemes) Bill 2017-19, has not progressed beyond the 2nd reading stage yet and has not become a legal requirement in the UK yet. An initiative like that could provide security of retention monies held and could also address the issue of late release of retention if provisions for timely release of retention is incorporated.

Advance payment is one of the contractual examples to combat late payment (Rameezdeen et al. 2006) under contractual methods. However, whilst advanced payments are made in developing countries, implementing this idea in the UK may not be straightforward. Given that cash flow is the most crucial aspect for any company in the supply chain, coupled with the fact that construction projects are volatile in costs and changes, clients would be reluctant to pay for the goods and services upfront before receiving their finished project. One method to combat the ongoing retention issues would be Project Bank Accounts (PBA) enabling SMEs working in government projects to receive payment in five days or less from the due date (Cabinet office 2012). A third party releases all monies owed to the subcontractor, so the employer does not have the overall control of the funds. They are a means to enable faster payments for companies further down the supply chain and protect against upstream insolvency risks (Jeffery 2019). To promote the PBAs initiative, the Government Construction Strategy set a target for £4bn of contracts to be awarded using project bank accounts by the end of 2013 to 2014 (ibid, Morby 2014). However, PBAs uptake in the industry is limited (Klein 2015, Swai et al. 2020). The main contractors tend to avoid their implementation as they are seen as costly and administratively cumbersome, increasing overheads and reducing profits (Wynne and Hansford 2014). Pye Tait Consulting (2017) states that similar performance-related bonds can be adopted to help prevent the misuse of retention. However, for subcontractors, using a retention bond instead of retention monies requires an agreement from the main contractor.

Administratively, some subcontractors have been found to employ more staff to try and prevent the payment issues from occurring, creating new job roles to help monitor payments and other accounting

information, primarily monitoring payment amounts and dates. According to Rufaro et al. (2008), although this method proves to be productive, SMEs cannot afford to do this due to the additional costs involved, which poses a problem for smaller companies. Nanayakkara et al. (2021) concluded that there is potential to extensively mitigate the issues of partial payments, payment delays, nonpayments, long payment cycle, retention, and security of payment issues using blockchain and smart contract technologies. Whilst acknowledging that the payment culture of the construction industry cannot be changed through technology, Nanayakkara et al. (2021) further concluded that blockchain and smart contract technologies offer the potential to speed up payments due to enhanced transparency need for accountability and reduced red tape. Although such administrative opportunities exist, they are seldom used in the industry as of now.

Research method

This research was conducted based on the principles of mixed-method research, in which both quantitative and qualitative data were collected and analysed to achieve the research aim and objectives (Cresswell 2009). Primary data was gathered through a case study and a questionnaire survey after obtaining ethical approval for the research. The case study was used to investigate actual data on retention and late payments across 30 construction projects from a selected subcontractor. 30 ongoing and recently completed projects were selected based on the availability of access to payment details and the access to professionals involved in those projects. The questionnaire survey then gathered opinions of the professionals dealing with the issues of late payments and retentions.

Case study

A case study was used to gather primary data on late payments and retentions. According to Yin (2009), a case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, suiting the issues under investigation. The design of the case study followed Yin's (2009) approach to a single case study (one sub-contractor) with multiple embedded units of analysis (30 individual construction projects) within the selected case. A single case study company is used here as a

typical case of a subcontractor. The case study organisation was purposely selected considering the convenience of accessing the commercially sensitive data from live construction projects. The organisation was informed about the research, the type of data collected and the level of information shared within the external members of the research group. The case study organisation is a well-established medium-sized specialist civil engineering subcontractor primarily involved in groundworks, including bulk earthworks and remediation, concrete foundations and reinforced concrete structures, drainage and other external works in the North East of England. Selected 30 projects were all undertaken over the last five years. They had varying initial contract values (from £28,000 up to £2.3millon, with a mean sub-contract sum of £847,000) and varying initial contract durations. The 30 projects had a total of 355 periodic and final payments. The case study projects involved 15 different main contractors, providing a good account of main contractor practices.

Data related to late payments and (late) release of retention was gathered by looking at payment certificates, related accounts, meeting minutes and verbal conversations with the quantity surveyors working on the case study projects. Case study data was used

a) to establish the % of projects affected by late payments, the extent (in days) to which payments are late, the extent to which release of retention is late.
b) To test two hypotheses derived based on the typical number of payments in a subcontract
    a. H1: The more payments on a project, the higher the average delay on payments
    b. H2: The more payments on a project, the higher the percentage of late payments

Informal discussions with the project quantity surveyors both from the case study organisation and the questionnaire survey sample were held to clarify any other issues around late payment and release of retention.

Questionnaire survey

A short supplementary questionnaire survey was then used to gather the opinion of a broader population of sub-contractors and establish whether the trends observed in case study projects are representative of other subcontractors. A short closed questionnaire with two additional open-ended questions was designed to increase participants willingness to complete. The open-ended questions were included to gather the perceptions of the respondents. The questionnaire survey was hosted on Google forms, and a link to participate was sent to 55 randomly selected subcontractors. The representatives from these subcontractors working as quantity surveyors and estimators were targeted as the sample. Quantity surveyors and estimators were explicitly selected since they regularly deal with the payment applications and payment certificates. In smaller subcontractors, those with an 'estimator' job title were involved in payment applications, despite the norm. 21 (38%) of the contacted sample have completed the survey, and these responses were used for the analysis. 38% return rate was considered as an adequate response rate for construction sector research following Fellows and Liu (2008).

The survey comprised four key sections. The first section gathered the respondents' background to check their suitability to provide an opinion; to analyse the view of professionals from different backgrounds, and assess the frequency and extent of the issue of late payment across different trades. The second section gathered professionals' opinions on the extent and the causes of late payment. An open-ended question was used to gather the impact of late payment on subcontractor's cash flow. The third section gathered professionals' opinions on retention release issues, the suitability of the currently used retention scheme, and the suitability of the retained amounts. Finally, an open-ended question was used to gather any other opinions they like to share related to the current retention methods adopted in the industry.

Data analysis

Quantitative data gathered through the questionnaire survey and the case studies were analysed using simple descriptive statistics. Simple descriptive statistics provide a good way of summarising the overall problem of payment delay, highlighting the extent and the significance of the issue. In addition, inferential statistics, mainly the *t*-test, were used to test the two hypotheses stated above, with the help

of the SPSS statistical analysis tool. The *t*-test is a parametric test that measures the mean scores between two separate samples (Naoum 2013). In analysis, mean, standard deviation and *t*-test statistics are produced to compare sub-samples. The results of this will highlight whether there is a statistically significant difference between the two samples. An independent sample *t*-test was used to test the hypothesis at the 95% significant confidence level ($\rho \leq 0.05$). According to Farrell (2017), a 95% confidence interval is appropriate for this analysis. ρ here refers to ρ - value in correlation analysis and is used to measure the significance of the analyses during the hypothesis testing. The ρ -value would range from 0 to 1, and the number represents the probability that this data would have arisen if the null hypothesis were true. Spearman's correlation was used to measure the strength and direction of the association between the variables. Spearman's correlation (denoted by r_s) is a nonparametric measure of the strength and direction of association that exists between two variables measured on at least an ordinal scale (Laerd Statistics, 2018). Qualitative data gathered through the open-ended questions of the questionnaire survey were analysed using the principles of thematic analysis. In particular, principles of inductive thematic analysis was used to develop codes and themes (Miles and Huberman 1994, Hsieh and Shannon 2005). This method was preferred over other qualitative data analysis and presentation methods due to the simplicity, research question, and data. The steps involved in the analysis are summarised in Fig. 1.

Findings and analysis

Data collected from the case study organisation on 30 randomly selected projects were analysed for late payment issues and retention release. These findings are discussed collectively with the supplementary questionnaire survey findings.

Late payment

The extent of late payment

Out of the 30 selected projects, all payments were on time in 5 (16.7%) of the projects. These 5 contracts were with 4 separate main contractors. This means at least 1 payment was late in 77% of the projects.

The 30 selected projects have had 355 periodic and final payments involved (a mean of 11.8 (~12) payments per project, with a median of 10.2 (~10) and a standard deviation of 6.6). Out of these, 163 payments (46%) have been paid later than the due date, with a mean value of 5.2 (~5) payments per project. This suggests that nearly half of the payments have been late in the projects selected for analysis. Across the 355 payments, 1943 days of delay were observed (making deductions for instances where payments were ahead of the due date). Out of the overall number of payments, this is 5.8 (~6) days per payment. If only the instances (163) where payments were late are considered, this is on average 11.9 (~12) days per late payment. The longest delay observed was 22 days, which was observed in 2 instances.

In summary, the data suggest that the sub-contractor has been paid later than the due date in 46% of the instances across the 30 projects, and on average these payments were late by 12 days. On a monthly payment cycle (as is the case in most contracts), 12 days (close to 2 weeks) is a significant additional duration to wait to get paid. In 17 (56.7%) projects, more than 50% of the payments have been late. All the payments were made later than the due date in 2 of the projects analysed (see Fig. 2.). These findings confirm the gravity of the problem as discussed in the literature section. Swai et al. (2020) highlighted two key influential factors that contribute to such adverse payment practices by the main contractors towards their subcontractors. They are undue commercial interests of the main contractors and the widespread use of adhesion contracts (take it or leave it), which leaves subcontractors with little choice but to absorb late payment costs.

54% of the payments have been made on time or ahead of the due date. Whilst the ideal situation would be that all payments are made on time, this suggests that SME sub-contractors can expect around half of their payments to be received on time. Interestingly, there were also instances of payments being made ahead of the due date (see Fig. 2). This was the case in 39 payments (11%), and such instances were noticed across 14 projects. On average, such payments have been made by 6 days in advance, with the best situation being 2 payments being made 16 days ahead of the due date. As mentioned above, no payment was late in 5 of the projects. In 6 projects, the cumulative number of days the payments were

late across the project was either zero (0) or less (i.e. payments made either on time or early). These data suggest that there are also instances where the main contractors have been righteous to their sub-contractor, and in effect, have contributed positively to their cash flow.

Findings from the questionnaire survey further supplemented the above results. As mentioned in the research method section, the questionnaire survey sought to gather the views of a substantial number of subcontractors on late payment and retentions. 21 responses were received from the targeted sample of 55 subcontractors. Out of these, 71% were Senior Quantity Surveyors or Quantity Surveyors, whereas the remaining 29% were Estimators or Senior Estimators. Most professionals (81%) who responded have been in the industry for over 5 years, meaning they have the relevant experience to provide an informed account of the issues being investigated.

A 5-point Likert scale was used to gather the agreement/disagreement of the respondents about experiencing late payment in their projects, with the options ranging from Strongly Disagree to Strongly Agree. To calculate the weighted average, scores were allocated from -2 to 2 for Strongly Disagree to Strongly Agree, with 0 being allocated for the mid-point in the scale. A weighted score closer to -2 or 2 would indicate strong disagreement or agreement with the statement.

The weighted average score was 1.24, indicating that the respondents agreeing with late payment being a common problem they experience in their projects. 95% of the respondents stated that they have experienced late payment in their projects. This confirms that late payment is a regular issue experienced by subcontractors in construction. When questioned about the average time a payment was late, 81% of the respondents selected the option of between 1 – 2 weeks. This is broadly similar to what was observed in the case study projects. 9.5% (2) of the respondents selected the option of between 3 – 4 weeks, whereas 4.5% (1) respondents mentioned that payments are more than a month late. This suggests that some subcontractors experience even longer payment delays. 1 respondent out of the 21 mentioned that their payments are generally received on time.

Findings from the survey shed light on the impacts of the late payments. Out of the 21 respondents, 62% (13) respondents agreed that they had experienced cash flow problems due to late payment. The

majority of the respondents (55%) pointed to its impact on them paying the rest of the supply chain. Late payment to a higher level subcontractor often causes delays further down the supply chain creating a domino effect. Although 'pay when paid' provisions are now banned, in practice, a higher level subcontractor not getting paid on time affect other companies lower down the supply chain. One respondent claimed they needed to utilise company overdrafts to help bridge the gap between late payments, thus incurring additional costs. Another respondent claimed, in what seems a more extreme case, that they had to temporarily lay off staff as they lacked the funds to pay wages. It was claimed that this was necessary to avoid bankruptcy. These are the cases that the industry needs to get rid of to protect the smaller companies that may not have the financial capabilities to deal with late payments.

The remaining 38% (8) respondents stated that they have managed to withstand the impacts of late payment on their cash flow. This shows that although subcontractors frequently experience late payment, some are prepared to weather the storm. Wedawatta and Ingirige (2014) noted that previous experiences, being a well-established business, the financial strength of the business, the experience and the professional competence of senior management in the business as some of the critical factors that contribute to the ability of contractors to deal with adverse financial impacts. It can be presumed that the companies of the above 38% of the respondents may be in a better position to weather the storm of late payments due to similar strengths. Overall, these findings confirm that late payment is a concern for subcontractors.

Relationship between contract value and late payment

The percentage of the late payments and the average number of days an individual payment was late were cross analysed with the contract value to observe whether the issue of late payment was correlated to the contract value. Fig.3. demonstrates how the percentage of late payments and the average number of days a payment is late for the sample, along with their contract values. The sample included 11 projects with less than £500,000 subcontract value, 8 projects with a subcontract value between £500,000 and £1 million, and 11 projects with over £1 million subcontract value. Spearman correlation coefficient was calculated to determine whether there was a statistically significant correlation between

the contract value and late payment. Statistical analysis revealed no statistically significant correlation between the contract value and the percentage of late payments in a project (r_S = -.178, ρ = 0.308). Similarly, no significant correlation was observed between the contract value and the average delay (r_S = -.193, ρ = 0.346). This essentially suggests that late payment is habitual and a norm in the industry rather than being linked to the contract sum and thus could be present in even relatively smaller contracts.

Relationship between number of payments and late payment

Fig. 4. shows the relationship between the number of payments in the total sample and late payments. To further analyse any potential link between the number of payments in a project and the extent of late payment, payment data from the projects were analysed to test the hypothesis established. The hypotheses sought to assess whether there is a link between the number of payments and late payments in a project. For this purpose, the sample was divided into 2 groups; projects with 10 payments or less and projects with more than 10 payments. A cut-off point of 10 payments was used as this was the median in the sample (see 4.1.1). This is due to the standard length of a project for the case study subcontractor typically being 9 months with a month for settling the final account, which equates to 10 months total or 10 payments. Each group had 15 projects.

The first hypothesis sought to establish whether more payments on a project leads to longer payment delays. On projects with 10 payments or less, the average delay was 4.1 days (11 days if only the late payments were considered). On projects with more than 10 payments, each payment was 6.1 days late on average (12.2 if only the late payments are considered). On the surface, this suggests that the number of days a payment is late increases when there are more payments on a project – with projects with more than 10 payments experiencing 2 extra days of delay in receiving payment on average, compared to projects with 10 payments of less.

The first hypothesis H_1 is that the more payments on a project the longer the average delay on payments. The critical *t* value for 2 equal independent samples of 15 at 95% confidence interval was 2.048 for a 2-tail test. This means if the calculated *t* value for the 2 samples exceeds ±2.048, the average payment delay is statistically different between the 2 samples. Equal variances cannot be assumed in this instance

as the ρ value in Levene's test for equality of variances is higher than 0.5 (See Fig. 5.). The calculated *t* value for average payment delay was 2.129, indicating a statistical difference between the 2 samples. Therefore, H_1 is proven, and the alternative hypothesis is accepted. This means that on projects with a higher number of payments (more than 10), subcontractors are likely to experience longer payment delays.

The second hypothesis sought to establish whether the more payments on a project the higher the percentage of late payments. On projects with 10 payments or less, 40.7% of the payments were late on average. But on projects with more than 10 payments, 57% of the payments were late on average. On the surface level, this shows that subcontractors are likely to experience payment delays on a higher percentage of payments when the number of payments is higher. The statistical analysis revealed that the calculated *t* value for the percentage of late payments was 1.594 (See Fig 5). This suggests that the percentage of late payments was not statistically significant between the two samples. Therefore, H_2 is not proven, and the null hypothesis is accepted. This suggests that although the descriptive statistics point to a higher percentage of late payments on projects with more than 10 payments, this difference is not statistically significant i.e. subcontractors are likely to experience payment delays in a similar percentage of payments irrespective of the number of payments in a project.

Delay in releasing retention monies

The literature revealed that abuse of retention by main contractors is a common occurrence within construction. This affects the subcontractors negatively, as the retention percentage is often in the same range as their profit margin in a project. Providing evidence for this, in 14 (47%) of the projects analysed, the retention amount was higher than the profit margin in the project. On average, the total retention amount was 133% of the profit margin in the sample. In UK construction projects, half of the retention is usually released at the practical completion stage, and the remaining half is released at the completion of the defects stage (at the end of the rectification period). In 11 (37%) projects, even half of the retention was higher than the profit margin. This means that the subcontractor will not realise any profit until the final retention payment is recouped in these projects. With an average rectification period of 12 months,

the subcontractor will thus have to wait for this period from the practical completion, and any further period the payment is late to realise a profit in these projects.

Out of the 30 projects selected for analysis, the final retention has been due on 40% of projects. This means that the remaining 60% of the projects analysed had not reached this stage at the time of the analysis. Out of the 12 projects in which the final portion of the retention was due to the subcontractor, the release of this amount was late on a staggering 92% of the projects, i.e. release of retention was late on all except 1 project, in which the final proportion of the retention has been released on time. On average, the release of the second half of the retention was 56 days late. This is a wait of nearly 2 months beyond the due date to receive the second half of the retention. Coupled with the information presented above about the link between profit and retention, the financial strain of such a significant delay on subcontractors' cash flow will be significant. These findings suggest that subcontractors need to be prepared to withstand such impacts in their projects. If the above delays are not factored into their cash flow planning, subcontractors with limited financial muscle can experience significant cash flow problems which could cause additional costs of short term finance or even the threat of business closure in extreme cases. Abeysekera and Wedawatta (2008) discussed various ad-hoc arrangements that are used as countermeasures but noted that they are mainly of value to main contractors but not to subcontractors. Further, it was noted that similar to main contractors negotiating for better deals with clients for example, leveraging their reputation, subcontractors too sometimes negotiate favourable retention regimes with contractors, but the ability to do so remains limited for subcontractors. Instances of subcontractors mitigating the risk by providing price discounts instead of retentions have been noted (Abeysekera and Wedawatta, 2008).

Results from the survey revealed subcontractors view on the late release of the retention in general. 62% of the sample mentioned that the average retention on their projects is 5%, with 24% stating this as 3%. The remaining sample stated this as 1%. While both the most commonly used standard form contracts in the UK, JCT and NEC contracts, allow the client to amend and opt for a suitable retention percentage, the

default retention amount included in the JCT contracts is 3%. The findings suggest that the subcontractors are often subjected to higher retentions than this default amount.

The respondents were asked to answer 4 Likert scale based questions on retention. A 5-point Likert scale was used with the options ranging from Strongly Disagree to Strongly Agree, as in 4.2.1. The first question queried whether they had experienced problems receiving the first half of the retention (at practical completion). The weighted average score was 0.38, indicating that the respondents agreed that they have experienced problems. In practice, the release of the first half of the retention is likely to be easier for the subcontractors to get hold of given they are on-site and in direct contact with their client (main contractor). The second question queried whether they experienced problems receiving the second half of the retention (at defects completion). The weighted average score for this was 1.00. This indicates that the problems experienced with receiving the latter part of the retention are more prominent than the first component. The views experienced by the respondents aligns with the case study findings, where significant delays to receiving the second part of the retention were observed. The informal discussions with project quantity surveyors suggested that a key reason for this is companies not chasing the final retention on its due date.

Given that subcontractors have varied capacities, it in some cases can be challenging to allocate staff specifically to monitor and chase retention monies after a project has been completed. The use of recent innovations such as the Project Bank Accounts could help the subcontractors here. The monies will be released on time when due to the relevant parties (linked to the certificate of making good). Swai et al. (2020) confirmed that PBAs have proven effective, countering against main contractors deliberately withholding payment from subcontractors to boost their working capital and profit margins.

The participants also agreed that the current system of retention is flawed. The weighted average score here was 0.81, again indicating agreement with the statement. Participants disagreed that the retention amount held is justified considering the amount of rectifying work required. The weighted average score here was -1.00, indicating disagreement with the statement. This highlights another critical issue with retention, and it is rarely used for its intended purpose – which is to facilitate making good of potential

defects in a project. The capping of retentions is one method discussed in the literature to prevent such abuse. If the retention amount held more closely reflects the amount of rectifying work subcontractors have to do on a project, it will serve the purpose. This requires further studies to be undertaken and an evidence-based percentage to be established as a maximum level of retention allowed in projects.

A final open-ended question was provided, allowing the respondents to voice their opinions about the retention methods adopted in the industry. The main themes within the answers were that the system was unfair and easily abused by main contractors. For example, many respondents pointed out that cash retention is often a tool for main contractors to hold monies to protect their best interests, which is excessive compared to the rectifying work required. In most projects, the retention percentage held by the client from the main contractor is either reciprocated or increased by the main contractor for their subcontractors. It can be argued that it can be lowered. This is because the main contractor can verify the work of the subcontractors and certify payment amounts better (than a client), thus limiting the amount of rectifying work required later. The respondents also stated that early release of retention is used as a bargaining tool in final account agreements by the main contractors. One respondent stated that the current retention system is outdated and needs a revamp; another stated that the main contractors easily abuse the system, and the government could do more to implement measures such as project bank accounts. These findings agree with the remarks by Swai et al. (2020) who claimed that findings such as these confirm the strong commercial influence that main contractors exert on subcontractors and suppliers in construction. It was also noted that despite such irregularities, unfair payment practices in the industry are hardly challenged by subcontractors (Swai et al. 2020).

Discussion

In summary, the case study findings revealed that late payment to subcontractors is a common occurrence and is a norm in the UK construction industry. To combat late payment, there need to be dedicated enforcing provisions in contracts which could include levying charges on overdue payments (Haron and Arazmi 2020). However, it was evident that some subcontractors are reluctant to negotiate or enforce such contractual provisions due to competitiveness in the market and commercial concerns. This

agrees with a study by Bibby Financial Services (2016). It was noted that 'over half of UK subcontractors believe that they must accept the terms of contracts with large construction firms, or face the risk of losing future business. This highlights the power imbalance between main contractors and sub-contractors where a majority of the subcontractors do not believe that they can influence the terms of the agreement with their main contractor. Within this context, administrative strategies are equally important to avoid late payments. There are several administrative strategies available for sub-contractors ranging from proper record keeping to early invoicing and potentially capitalising on initiatives such as the use of contract management software, blockchain and smart contract technologies. Blockchains and smart contract technologies offer the potential to speed up payments (Nanayakkara et al. 2021) by setting up automated contractual provisions. The use of BIM (Building Information Modelling) and real-time costings can further help to solve payment issues. BIM implementation with smart contracts has a clear potential to speed up the payments between contractors and subcontractors (Trivedi 2020).

Overall, the findings of the short questionnaire have shed further light on late payment issues experienced by the subcontractors. It has to be noted though that these are the perceptions of the subcontractor organisations, and a different account may be provided if the views of the main contractors are also analysed. For instance, the National Construction Contracts and Law Report (NBS 2018) shows that the clients, contractors and consultants have different views about which party is responsible for disputes in construction. Similar differences may exist between the views of the main contractors and the subcontractors when it comes to payment practices. However, the case study findings confirm the views expressed by the questionnaire respondents and provide a realistic account of payment issues experienced by a typical subcontractor in construction.

Questionnaire survey respondents raised the issue that the retention percentages being charged from the subcontractors (often a rate of 5%) is excessive, compared to the rectification work to be expected. Further research can be undertaken to assess the extent of rectification work expected in subcontracts and arrive at a suitable evidence-based retention percentage. What was clear from the findings is that

the late release of the final component of the retention to subcontractors is a real concern, with the case study projects suggesting that this delay could, on average, be close to 2 months. Whilst mitigation measures such as interest on late payment and the ability to cover any additional costs due to late payment are available for sub-contractors, it was identified that these measures are rarely used in the event of late release of retention monies. Therefore, an externally operated retention deposit scheme as suggested by the Construction Retention Deposit Schemes Bill could be more effective if implemented.

This research provides real data-driven evidence to substantiate that late payment to subcontractors is widely embedded within the construction sector in the UK, irrespective of the contractual provisions in place. This may suggest the importance of supporting SMEs cash flow via other government initiatives whilst the late payments are made to sub-contractors. The results also highlight the importance of speeding up the implementation of the retention deposit scheme. The next step of this research would be to investigate sub-contractor driven strategies to absorb the negative impacts of late payment to SMEs and individual skilled personals. Such understanding would also provide valuable insights related to reducing construction cost, bankruptcy rate, and retention of skilled workers within the construction sector.

Conclusion

Key findings from the case study company and the projects provided a detailed account of the payment delays experienced by an SME subcontractor. Supplementary questionnaire findings allowed case study findings to be contextualised into a broader sample of subcontractors. While numerous initiatives have been undertaken and the security of payment legislation has advanced over the years, findings confirm that late payment is still a recurrent phenomenon and a norm in UK construction, especially for subcontractors. This suggests that a culture change may be needed if this norm is to be changed. The findings from this research advanced knowledge on critical issues such as average payment delays likely to be experienced by SME subcontractors, whether late payment is linked to contract value, the link between the number of payments and late payment among other issues - specific analysis of subcontractor perspective concerning late payments which was scarcely available. As noted by Peters et

al (2019), such findings can contribute to developing initiatives containing various legal, contractual, and administrative solutions to mitigate or prevent payment issues. The information will enable SME subcontractors to plan for the cash flow problems they could encounter due to late payment.

The relatively small sample size is a limitation of the study. This, however, is minimised by methodological pluralism, with case study data being supplemented with questionnaire findings. The findings highlight valuable insights that practitioners, including SME subcontractors and policymakers, can take into consideration. The findings provide much needed quantified evidence of payment practices that can be reflected in developing regulatory, contractual and administrative countermeasures in the UK and beyond. Further research from multiple case study organisations on the exact impact of these delays on subcontractor finance, an evidence-based retention percentage that reflects the likely rectification work for subcontractors would be helpful going forward. The focus of this research was on late payment, further research can be undertaken on the subcontractor perspective of non-payment – which too is a matter of grave financial concern for subcontractors.

Data Availability Statement

Some or all data, models, or code generated or used during the study are proprietary or confidential in nature and may only be provided with restrictions.

- Anonimised summary data from case study projects

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Figures

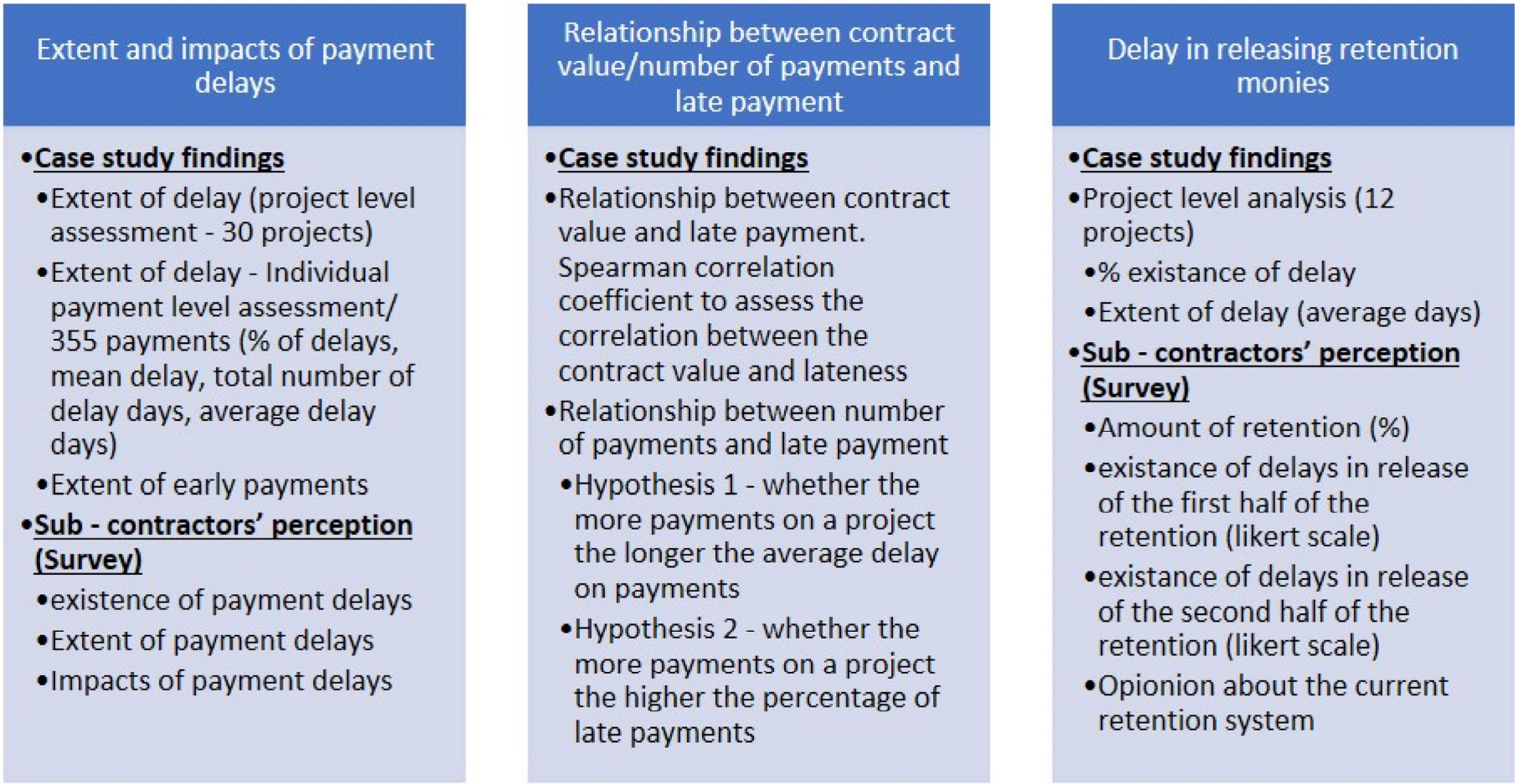


Fig. 1. – Research design

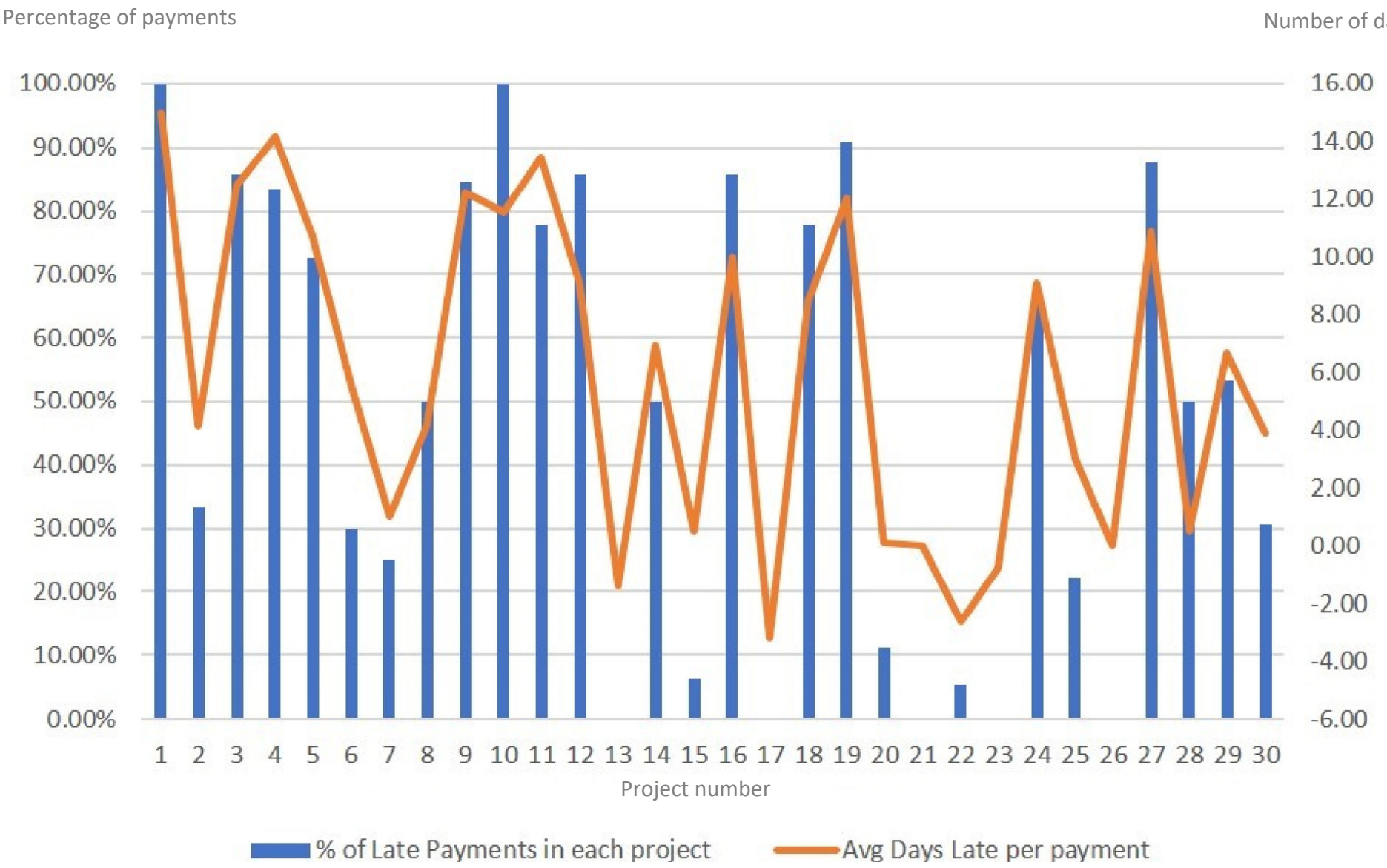
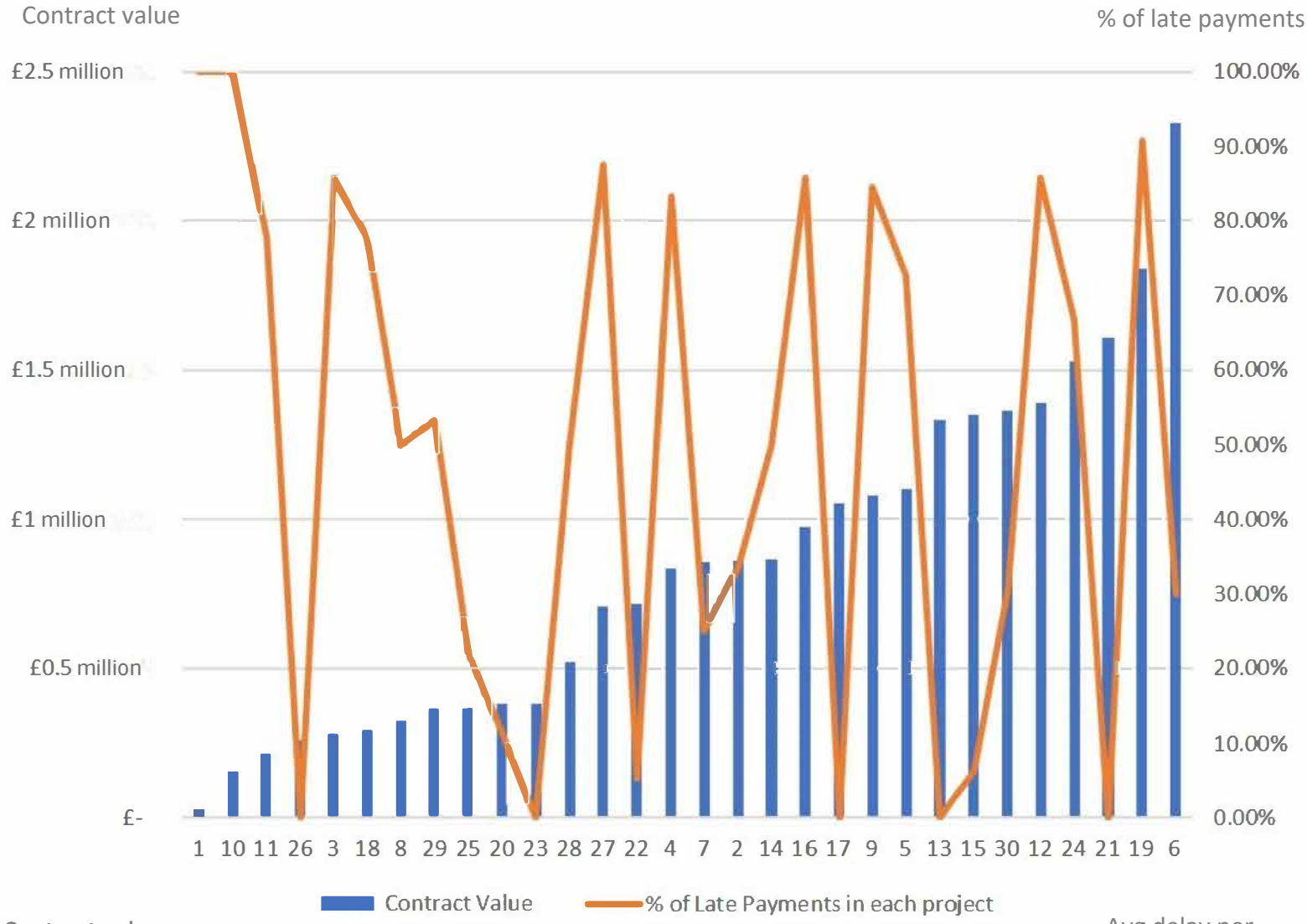


Fig. 2. – Percentage of late payments in each project and the average payment delay



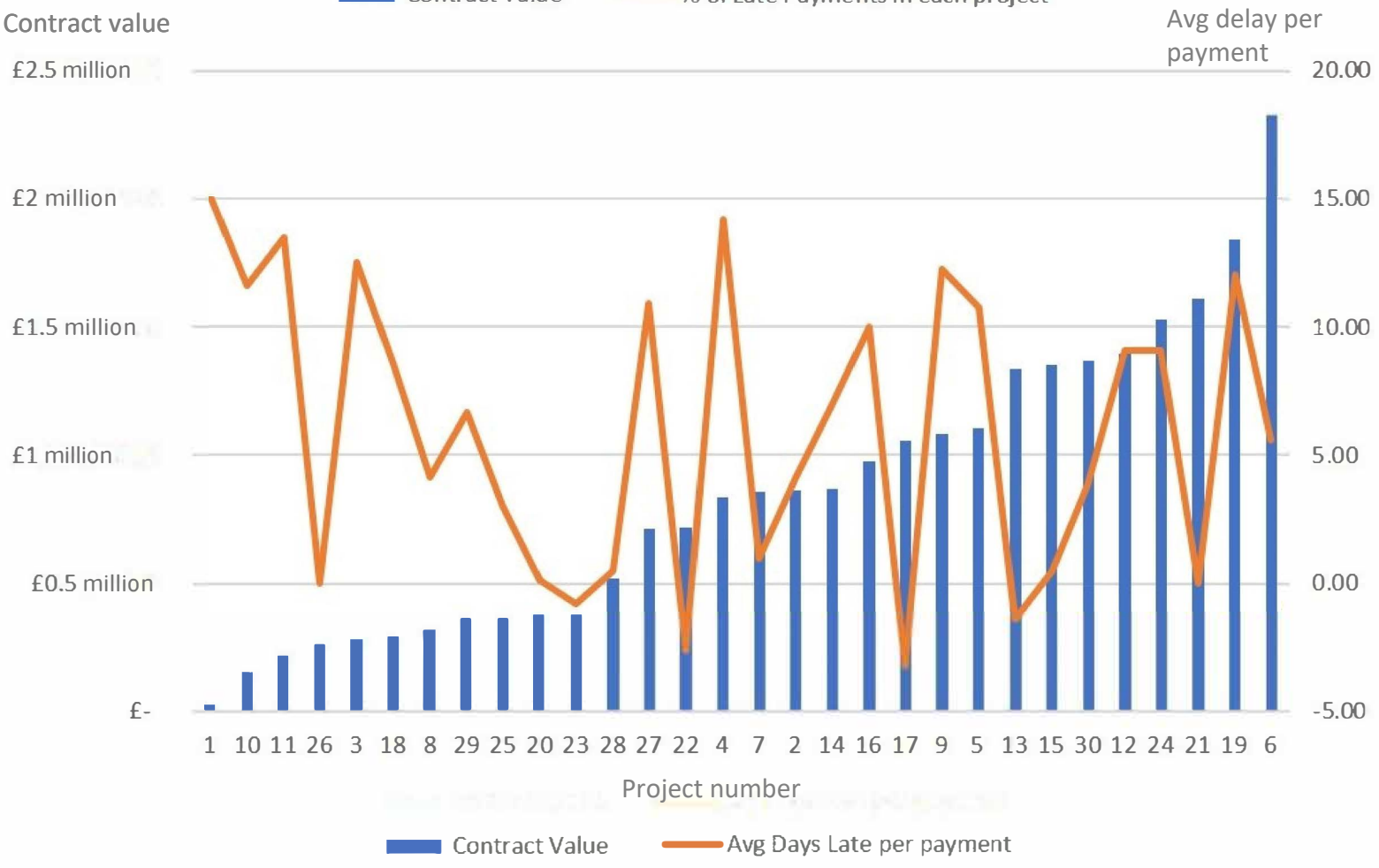
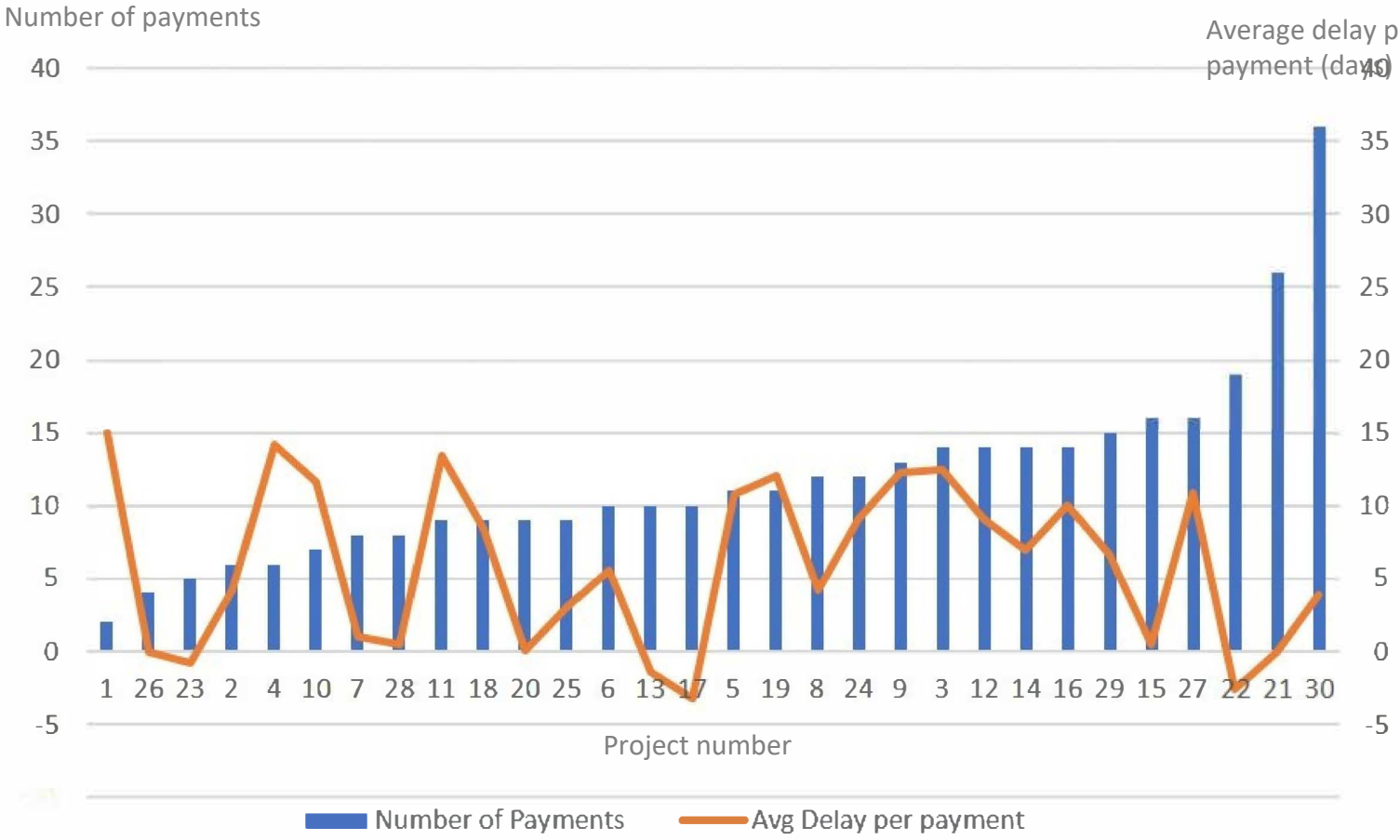


Fig. 3. – Relationship between the contract value and late payment



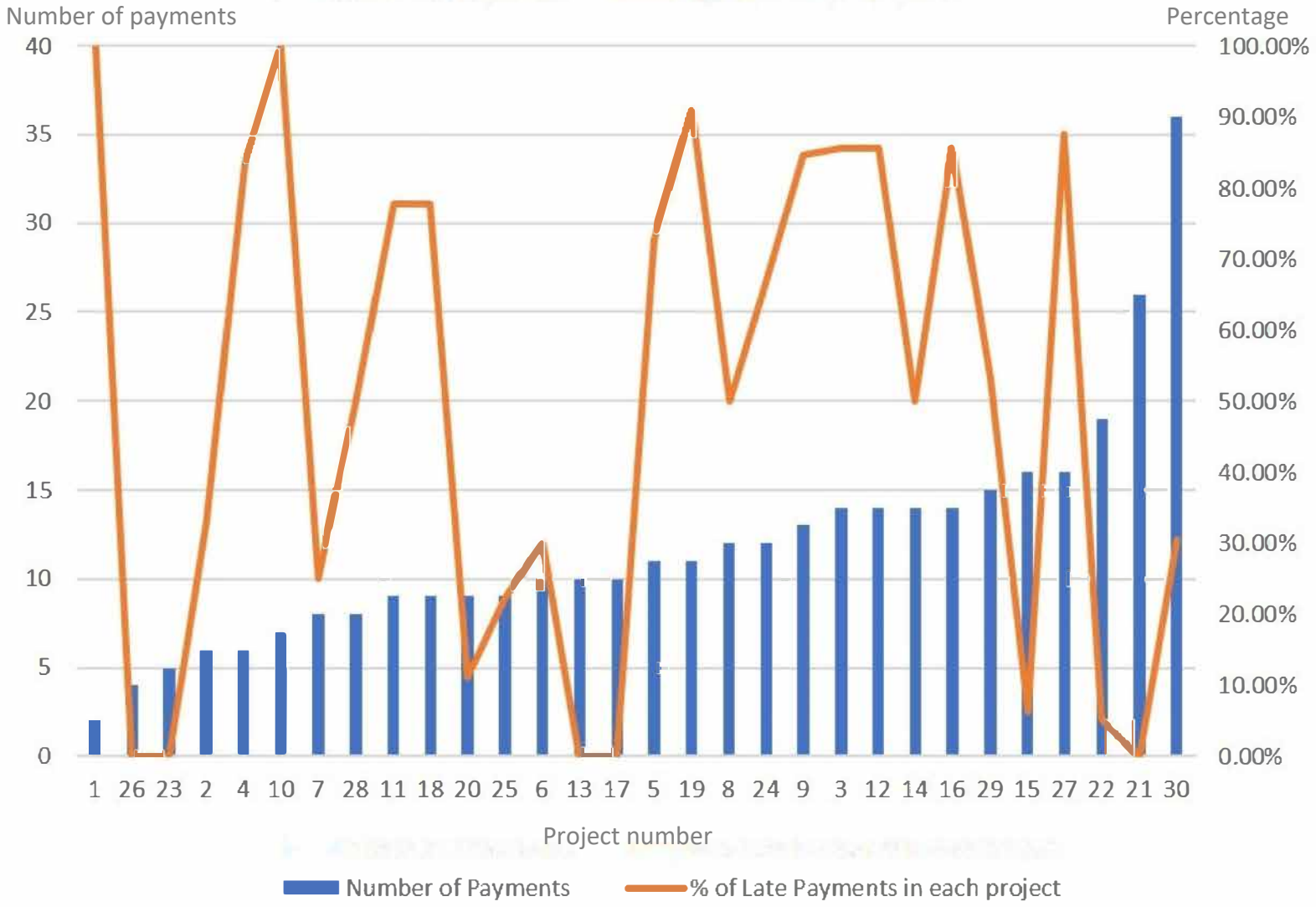


Fig. 4. - Relationship between the number of payments and late payment

Independent Samples Test for Average payment delay

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Average days of payment delay	Equal variances assumed	.022	.882	2.129	28	.042	4.11600	1.93332	.15577	8.07623
	Equal variances not assumed			2.129	27.967	.042	4.11600	1.93332	.15555	8.07645

Independent Samples Test for Percentage of late payments

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Percentage of late payments	Equal variances assumed	.334	.568	1.594	28	.122	20.22733	12.69354	-5.77421	46.22888
	Equal variances not assumed			1.594	27.846	.122	20.22733	12.69354	-5.78069	46.23536

Fig. 5. – Independent sample t-tests for average payment delay and percentage of late payments