**Investigating skill shortages in the UK Construction Industry: A study on job-specific skills for Quantity Surveying & Engineering roles**

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**Abstract**

The UK construction sector is one of the country's leading economic drivers, however a perceived shortage of skilled professionals is becoming a challenge for a field that relies on its workforce more than most. This research paper investigates these skill shortages within the UK construction industry and evaluates quantity surveying and engineering apprenticeships against full-time degree education to see how these skills shortages can be tackled. Comparing both routes will determine their effectiveness in producing and providing job-specific skills to the UK construction industry. Existing literature will be analysed to provide an understanding of the reasons behind the UK construction industry’s skills crisis. It will then carry forward to examine the current contribution that apprenticeship schemes and full-time degree courses are having on the UK construction industry. A questionnaire survey is employed to further validate and / or compare the findings within the literature review. The main findings concluded that the skills crisis is due to an ageing population, negative perceptions, poor image, lack of understanding of the roles and poor advertisement of these job roles within schools. In addition to this, the questionnaire provided further original insights which demonstrates that the UK construction industry highly value the job-specific skills that are formed through an apprenticeship scheme. The key finding being that apprenticeships provide both theory and practical on the job training and this is seen to be where full-time degree education cannot compete, with the teachings and challenges that arise from real-life working scenarios. The paper concluded and contributed to the existing body of knowledge through a number of recommendations, including the dominant focus on the structure and delivery of apprenticeship schemes, as the retention rate is fairly low compared to the number of entrants.

**Keywords:** Job-specific skills, Quantity Surveying, Engineering, Apprenticeships, Full-time degree

**1.0 Introduction**

Skill shortages within the UK construction industry have been a consistent and growing concern. More recently a shortage of skills is causing projects to be postponed as there is a lack of personnel available to facilitate the construction process (Federation of Master Builders, 2018). Barnes (2019) goes on to identify a number of professional occupations that are lacking job specific skills. Both quantity surveyors and engineers are part of this group and will form the focus of this research paper. The skill-set for both professions can be achieved through an apprenticeship or full-time degree route. Both routes will be evaluated to consider which pathway is the most effective and beneficial for the industry to obtain job-specific skills. In addition to the above, the basis of this research has emerged from the current pressing matter of the UK Government wanting to achieve a target of “increasing the total number of construction apprenticeships starts per year to 25,000” by Dec 2020 (Department for Business Energy and Industrial Strategy, 2019a).

Whilst there is currently a national emphasis on apprenticeship schemes, this research paper aims to critically evaluate whether such schemes are an effective solution to help tackle the UK construction industry’s skills gap, when compared to full-time degree courses. It will consider the contribution of both forms of training and the suitability of these schemes against the industry’s job specific requirements. This is an ongoing and existing area that needs to be addressed, in order to ensure that the UK construction industry can continue to develop without sacrificing quality and impairing growth.

**2.0 Research Aim** **and Objectives**

The aim is to examine why the UK construction industry suffers from skills shortages and assess the effectiveness of apprenticeships and full-time degrees, in obtaining quantity surveying and engineering job-specific skills. Following objectives were set to achieve the above aim.

1) To recognise the reason behind skill shortages in the UK construction industry for quantity surveying and engineering professions.

2) To explore the solutions to reduce skill shortages in the UK construction industry for quantity surveying and engineering professions.

3) To understand the current contribution of apprenticeship schemes and traditional university routes within quantity surveying and engineering professions, in the UK construction industry.

4) Assess the effectiveness of apprenticeships schemes against traditional university routes for quantity surveying and engineering professions.

5) To suggest recommendations to address skill shortages in relation to job-specific skills for quantity surveying and engineering professions.

**3.0 Research Scope and Limitations**

Apprenticeship schemes have been selected to evaluate their effectiveness, in providing job-specific skills against full-time degrees courses within the construction industry; as the UK government have set a target to increase the number of apprentices that are working in the industry by 2020. Therefore, by researching whether these schemes are an effective route to provide sufficient skills, will contribute to the existing body of knowledge in determining whether apprenticeship schemes should be the focal point or whether full-time degree routes need to be focused on to decrease the UK construction industry’s skills gap.

**4.0 A Review of existing literature**

**4.1 Definition of Skills**

This research is focusing on job-specific skills; therefore, it is important to distinguish between skills and job-specific skills. A skill can be defined as “the ability to carry out a purposeful activity with facility; the proficient application of knowledge and process to a task” (Butler, 1978). However more particularly Banerji et al. (2010) as cited by Almeida et al. (2012) describes job-relevant skills as “a set of competencies or abilities valued by employers, which include technical skills relevant to their specific job role.” Moreover, Polavieja (2012a) describes job-specific skills as capturing “the knowledge needed to perform the tasks that define a given job, which workers do not possess prior to entering the employment relation.” Both definitions emphasise the importance of holding the appropriate expertise to successfully fulfil the requirements of a job role. However, the definition provided by Polavieja (2012b) states that these skills only come into operation after individuals have entered into the workforce. Hence why this research will aim to explore the role of apprenticeship schemes against full-time degree courses. As apprenticeships are structured programmes that combine theoretical study and practical on-the-job training (Education and Skills Funding Agency, 2015). Whilst full-time higher education courses, such as degrees are studies that are undertaken in a university only.

**4.2 Background of skill shortages within the UK Construction Industry**

It is evident that the UK construction industry has been suffering from a skills shortage, the Royal Institute of Chartered Surveyors (RICS) discovered that this problem became most critical in 2014 and still remains to be one, particularly for quantity surveying roles (Matsu, 2017a). Similarly, a survey undertaken by the Engineering Construction Industry Training Board (ECITB) revealed that employers are anxious that the increasing demand of engineering roles will not be met, which primarily falls down to the scarcity of competent and skilled workers (Pye Tait Consulting, 2019a). As a result, the UK government have identified that there is a strong requirement for the industry to employ workers and enhance their skill set, whilst maintaining a strong emphasis to keep hold of a competent workforce (Department for Business, Innovation & Skills, 2013).

As an industry which provides infrastructure that we are reliant on for living, working, healthcare, education, links for mobility and more (Department for Business, Energy & Industrial Strategy, 2018), it is vital that UK safeguards this industry. In addition, the construction industry’s economic impact is significant, as the Office of National Statistics (2019) reported that “the construction industry accounted for 6% of gross domestic product (GDP) in 2018 and influenced some of the main economic indicators, including inflation and employment.” One of the solutions to protect the industry’s growth and support such shortages, is that the UK Government have set a target to “Increase the total number of construction apprenticeships starts per year to 25,000” by Dec 2020 (Department for Business, Energy and Industrial Strategy, 2019b)

**4.3 Reasons for skill shortages in the UK Construction Industry**

*Ageing demographic*

An ageing demographic is currently affecting the industry, for both quantity surveying and engineering roles. The RICS (2019) describes the situation as a “retirement bomb on the horizon,” due to the average age of a surveyor falling into the late 50’s age bracket. In addition to this, the ECITB predicts that “just under one fifth of the entire engineering workforce will have retired or be near to retirement by 2026” (Pye Tait Consulting, 2019b). The CIOB (2015) goes on to state that these skill shortages will continue to increase, as a higher proportion of workers are leaving the industry, compared to those that are joining.

Therefore, emphasising the age imbalance within the industry, as the majority of workers are leaning closer to the retirement age and the industry is failing on attaining a young workforce to maintain survival.

*Poor Image and Negative Perceptions*

The construction industry has been suffering from a consistent image problem. This negative perception is present amongst both men and women and plays a significant role in the career decisions made by individuals, in particular the choices made in refraining to enter the industry (Fielden et al., 2000; Farmer, 2016). Descriptions such as, “dirty”, “unhealthy”, “insecure”, “low status” and “poor career prospects for educated people” (EC/WS Atkins report on the EU construction, cited in Latham, 1994) have repeatedly been associated with the construction industry and still remains to be a widely shared view; as results from a YouGov/ Construction United survey of 2,000 members of the UK public (2016) stated that 67% of the public would not want to be in a career within the construction industry, and the belief that the work is “dirty” still remains to be a dominant view that the public hold, as 58% of respondents associated this description to construction work (Laing O’Rourke, 2016a). Therefore, the literature clearly stresses that the construction industry has always struggled to be an industry which is perceived in a positive light.

*Gender imbalance:*

In addition to holding a poor image, Gale (1991) revealed that the overall image of the industry is seen to be one of male-dominance, thus it is not surprising that the number of applicants to enter the industry are primarily male (cited in Sommerville et al., 1993). However, looking more specially into engineering and quantity surveying professions, the gender imbalance still remains to be high, with females making up only 12.5% of the construction engineering workforce (Pye Tait Consulting, 2019c) and 10% of the quantity surveying profession within the UK (Careersmart, no date). As a consequence of the proportion of males to females within these roles, it is unquestionable that the underrepresentation of women in the industry is a contributing factor to the UK construction industry’s skills dilemma; as the industry is failing to gain the skills from a large talent pool that would be able to offer their capabilities within these professions.

**4.4 Impact of skill shortages on the UK Construction Industry:**

The effects of these skill shortages are hindering the industry’s growth, as the RICS reported that businesses have been placed in situations where they have had to reject further work, due to staff shortages (Matsu, 2017b). Circumstances such as this raise the question as to how the industry will be able to facilitate the demand of new projects moving forward; as a total of 7,325 quantity surveyors will be needed to meet to the requirement of construction work within the housing and infrastructure divisions alone (Edgar, 2019a).

**4.5 Incentives to reduce skill shortages:**

*Government incentives:*

Government publications suggest that the UK government are focusing heavily on apprenticeship schemes to aid the construction industries skill shortage (Department for Business Energy & Industrial Strategy, 2018). Their target to reach 25,000 apprenticeship starts a year by 2020 is still in working progress, as 2018/2019 achieved 23,000 apprenticeship starts within the ‘Construction, Planning and Built Environment’ sector, as illustrated in the table below. Nevertheless, it is important to recognise that the industry has been on an upwards trend from 2012/2013 onwards, therefore if the number of entrants continue to rise, this goal may become achievable by the end of 2020 or soon after.



Figure 1: – Apprenticeship starts in England by sector subject area (Parliament. House of Commons, 2020

Furthermore, the monetary provision to support apprenticeship schemes lead to the UK government introducing the Apprenticeship levy, which came into operation in April 2017. The purpose of this tax was to see a rise in the number of apprenticeships and assist in the standard of training provided by business’s who deliver apprenticeship training schemes (HM Revenue & Customs, 2016). Nevertheless, since the implementation of the levy, the construction industry and the government both acknowledge that the levy is failing to perform its primary objective and there is a requirement for it to be developed further, to allow the industry and the government to attain what they need from it.

**4.6 The contribution of apprenticeship schemes and full-time university degree courses to the UK Construction Industry:**

There is minimal detailed literature in measuring the contribution of quantity surveying and engineering apprenticeships schemes to reduce the construction industries skills gap. This is because unlike the data collected for apprenticeship starts, government statistics against apprenticeship achievements have not been broken down by sector. it is comprehensible that the number of apprenticeship completions was on a steady rise, however more recently this dropped by a third in 2018 / 2019. This overall decrease in the amount of apprenticeship completions would suggest that the number of quantity surveying and engineering completions would have fallen as well.

Even though the number of entries into construction apprenticeships are on the rise, the amount of people completing their apprenticeship programmes does not mirror the number of starts.

Alternatively, employers are praising apprenticeship schemes, as 86% have specified that these training programmes have assisted in the appropriate development of skills which are specifically required by their organisation (UK Construction Online, 2018a). Moreover, apprentices have benefited from these training schemes as “over four in five apprentices” have expressed that the scheme has bettered their career prospect and this is represented by 85% of apprentices having either gone into full-time employment, or undertaken further training to enhance their knowledge (UK Construction Online, 2018b).

Similarly, existing literature has identified that the amount of people undertaking an engineering degree, do not always contribute their knowledge to these roles. As the ECITB (2018), reported that only 38.45% of engineering graduates joined full / part-time engineering job roles, 6 months after the completion of their degree qualification. Furthermore, degree courses are seen to be immensely theory based and focus too heavily on academic learning, causing them to be too detached from the construction industry’s needs; as students are lacking the development of obtaining the required practical skill-set (BMG Research, 2018).

Overall, when assessing the role of both schemes, the evidence suggests that both apprenticeship schemes and full-time degree courses may be effective in the short run, in terms of providing numbers to fill the skills gap. Although in the long-run, it is causing a threat to the industry as apprentices are not staying on to complete their programme and a fairly-low proportion of university graduates are going into their specialised academic area when joining the UK workforce.

**5.0 Methodology**

**5.1 Choices:**

A mixed method approach has been applied to achieve the research aim. The basis of this approach deals with obtaining both quantitative and qualitative data (Creswell, 2014a). As both forms of data are used, it is important to understand the difference between the two. Naoum (2019 p. 55 & 57) explains that “quantitative research is objective and is measured in numbers”, whilst qualitative methods are “subjective” and gathers information based on “meanings, experiences and descriptions.” This research takes advantage of the characteristics of quantitative and qualitative approaches, which Yin (2006) emphasises can increasingly strengthen a study, as both approaches are used concurrently, as opposed to utilising a singular approach out of the two techniques.

**5.2 Approach to data collection**

This research paper is exploring two key aspects; the first of which identifies why the construction industry is suffering from a skills shortage and the second part explores the means of apprenticeships schemes and full-time degrees in reducing this. To address both parts, the researcher has used secondary and primary data collection.

For the secondary data collection, a desk study approach includes the collection of secondary data (Naoum, 2019a) and was the most appropriate method to address objectives 1 – 3. The sources included government publications and statistics, academic research journals and reports published by the CIOB, RICS and ECITB. The secondary literatures sources included the use of ebooks and online newspaper articles (Naoum, 2019b).The use of secondary data within the literature review allowed the study to verify why the industry is suffering from a skills shortage and supported how apprenticeship schemes and degrees are contributing to the UK construction industry. Furthermore, as the duration of time allocated to the completion of this paper is fairly limited, the use of secondary data is readily available, which allowed information to be retrieved quickly and efficiently.

For the primary data collection, an online questionnaire was put together by the researcher to obtain data on the effectiveness of apprenticeship schemes against traditional university routes for quantity surveying and engineering roles. The questionnaire was made up of 14 questions, 12 of which were closed questions and 2 open questions. Closed questions only allow “answers which fit into the categories that have been established in advance by the researcher” (Denscombe, 2014, p. 176). Whilst open questions allow the respondent to answer the question based on the wording they wish to use, resulting in the answers being produced to be qualitative in nature.

The questionnaire was sent to 120 people within the UK construction industry and 58 responded. Non-probabilistic sampling was used by purposive and snowball sampling. The questionnaire was distributed among professionals working in the construction industry through researcher’s professional capacity of network and snowballing. The population was stratified according to their job role after sampling. There was a variation of job categories involved (i.e. site managers, project managers, quantity surveyors, engineers, supervisors, etc). Closed questions received a 96.5% response rate overall, however out of the two open questions 47 answered

the first question and 43 answered the second question. The overall respondent completeness of the questionnaire emphasises Denscombe's (2014a) view that open ended questions require a greater effort from the respondent and not all respondents will be as enthusiastic to answer these types of questions.

A major advantage of primary data is that it produces information which solely accommodates the researcher’s objectives and presents insights that the researcher would be lacking from the use of secondary data (O’leary, 2014, p. 202). Hence, as identified in the summary part of the literature review, the data available for the effectiveness of quantity surveying and engineering apprenticeships and degrees, was fairly limited. This is because the literature available on these routes addresses the impact on the industry as a whole, rather than spilt down into each profession within the construction industry. Due to this, the researcher made the decision to collect primary data, to ensure that objectives 4 and 5 can be fulfilled through composing questions that target the root of these research objectives. Although, the researcher will also gather information relevant to objectives 1 and 2, which will be addressed further in the findings section. Full confidentiality has been maintained by making the data entered by respondents anonymous. All participants were made aware of their anonymity and it was mandatory that they had to agree to the disclosure statement before they were able to proceed with the questionnaire

**6.0 Data Analysis, findings and discussion**

The final response rate was 48.3%. Even though a suitable response rate has been achieved, this can also be seen as a limitation as higher response rate would have provided a solidified view of the industry as a whole towards this research topic. If the time restraints weren’t as limited, it would have been beneficial to analyse the results from a larger sample group.

Statistical analysis has been used in the form of frequency distribution. Frequency distribution separates data into categories to accumulate the total number belonging into each category (Naoum, 2019c). This approach was the most effective and quickest means of analysing the amount of quantitative data which has been obtained in the literature review and produced as part of the survey results. The tables and graphs within the literature review, will be observed based on the total number fitting into each category and the data within the bar graphs and pie charts from the survey results, will be expressed as percentages.

Context analysis has been applied to the qualitative data that has been collected. This analysis allows the text to be quantified based on a defined unit. In this case the unit will be measured on sentences and keys words towards apprenticeship schemes and university graduates. The frequency of occurrence of the attitudes towards these schemes will allow a general theme to be established (Denscombe, 2014b).

To ensure that all the objectives have been achieved within the research paper, only those questions and answers that are specific to these objectives will be analysed in detail within this section. A breakdown of the questionnaire and results have been provided within the appendices (Appendix A&B). Objective 1 - To recognise the reason behind skill shortages in the UK construction industry for Quantity Surveying and Engineering professions.

Question 2 – What age category do you fall into?



The survey results suggest an alternative view to the secondary data in relation to an ageing population. Though, it is important to note that this is a limitation of the questionnaire, as it was only distributed and answered by a small proportion of people who work in the construction industry. In which case the data within the literature review is more reliable, as this data was obtained on a larger scale, which represents a true reflection of the construction industry as a whole.

Question 4 - What do you believe are the significant contributing factors to the UK construction industry’s skills gap, for Quantity Surveying and Engineering roles?



The sample group felt that the two most contributing factors, to skill shortages were due to:

1) Overall lack of understanding of the role

2) Poor encouragement and advertisement of the roles within schools

The above factors produced an equal response rate of 72.4%. This suggests that the construction industry needs to divert their focus on improving knowledge of these job roles and work accordingly

with schools to change perceptions of these roles, to promote positive advertisement and attitudes towards the industry.

Objective 4: Assess the effectiveness of apprenticeships schemes against traditional university routes for Quantity Surveying and Engineering professions.

Both quantitative and qualitative data have been collected for objective 4. Gathering qualitative data was important for this question, to get a true understanding, through the use of words and descriptions of the reasons why respondents feel that one route is more beneficial than the other.

Question 11 - How effective do you think Quantity Surveying and Engineering apprentices are within the UK construction industry?



Question 12 - How effective do you think Quantity Surveying and Engineering graduates are within the UK construction industry?



From a quantitative outlook, the scale reflects that they both perform well, with 1 being least effective and 10 being very effective. The percentage results over 5, shows that 80.7% of respondents felt that apprentices perform well against a percentage of 86.1% in relation to the effectiveness of graduates within these roles. The difference is fairly minimal which clarifies why the qualitative data was also necessary, to gain further insights about how the industry feels towards these training schemes.

**Apprenticeships qualitative analysis:**

The general theme, is that apprenticeships schemes allow for a “practical hands-on approach” when compared to full-time university education. Respondents felt that apprenticeships create the specific skills that are required for the industry, as apprentices are able to take advantage of “real-life experiences” and apply that to their learning where necessary. Furthermore, respondents went on to state that “university knowledge cannot compete with the skills obtained on site.”

**Full-time graduates’ qualitative analysis:**

The responses have created a split view point in relation to the effectives of full-time graduates within these specific roles. Some respondents believe that graduates have learnt all the theory they require, so when they do enter employment, they come with “all the skills ready to work.” The leading alternative view is that graduates are “less-job ready”, as “academic qualifications do not provide enough of the appropriate job-specific skills needed when starting work in the sector.”

**Objective 5: To suggest recommendations to address skill shortages around apprenticeship schemes.**

Question 5 - Does your company employ Quantity Surveying and Engineering graduates?

Question 6 - Does your company employ Quantity Surveying and Engineering apprentices?

The results from questions 5 and 6 indicate that a bias exists towards apprenticeship schemes, as 100% of respondents selected that their company does employ graduates, against 89.7% of respondents stating that their company employees’ apprentices. Further research would need to be undertaken to understand this minor prejudice towards employing apprentices. Although, the current research portrays the idea that apprenticeships can only be as effective as the industry allows them to be. It would be advised for the industry to change their perceptions towards such schemes, to allow the benefits of apprenticeships schemes to be fully attained.

Question 10 - What do you believe will be the most effective way to reduce the skills gap for Quantity Surveying and Engineering roles in the UK construction industry?



This question found that 32.8% of the sample group felt that increased awareness of these job roles would be the best way to tackle skill shortages. This was followed by 25.9% suggesting that improvements in apprenticeship training schemes provided by employers would be the most suitable option to consider. This emphasises that more can be done in the delivery of apprenticeships to safeguard the formation of the required job-specific skill set.

**7.0 Conclusions and Recommendations**

The research focus was on obtaining job-specific skills for quantity surveying and engineering roles; where both apprenticeship schemes and full-time university education were compared to distinguish which form of training will provide the essential skill set that the construction industry is on the outlook for.

The focus of this research was solidified through objective 4, however objectives 1-3 enabled a picture to be created of the current situation and contribution that these schemes are providing. Thus, summarising the findings of objectives 1-4 supported in further recommendations. The key findings from each objective include:

*Objective 1: To recognise the reason behind skill shortages in the UK construction industry for quantity surveying and engineering professions.*

The literature review and survey results produced similar findings, which interrelate with one another. The key factors which became most frequent were due to poor encouragement and advertisement within schools, lack of understanding of the role, poor image, negative perceptions and an ageing population.

*Objective 2: To explore the solutions to reduce skill shortages in the UK construction industry for quantity surveying and engineering professions.*

The most popular solution was to achieve an increase in the number of apprentices to help drive the

government’s 2020 target in relation to the number of apprenticeships starts. There was no emphasis on trying to increase the number of people undertaking a quantity surveying or engineering degree. However, the introduction of the new T-levels, will hopefully increase exposure of these roles and may lead to more students to pursue these professions through degree courses or apprenticeship routes. Businesses have also been advised to continue and / or revise their professional development principles as a corporation, to motivate workers to continue progressing in their specialised job roles.

*Objective 3: To understand the current contribution of apprenticeship schemes and traditional university routes within quantity surveying and engineering professions in the UK construction industry.*

Overall, both routes appear to be contributing to the industry in the short-term. As apprenticeships starts are on the rise and a number of people are undertaking degrees. Whist this may be the case, it appears to be a short-term solution only, as the retention rate against apprenticeship completions and number of graduates who then enter the construction workforce is fairly poor against the number of entrants.

*Objective 4: Assess the effectiveness of apprenticeships schemes against traditional university routes for quantity surveying and engineering professions.*

The evidence strongly suggests that the industry values the skills that are created and evolved within an apprenticeship scheme; the key driver being that apprenticeship schemes place individuals within real working life situations and it is through training such as this, will an individual be providing the specific job related skills that the industry requires. Although it is important to note, that degree courses are still valued by the industry, but are seen to be heavily focused on the theory aspect, which does not always reflect the operations that occur within a practical environment.

*Objective 5: To suggest recommendations to address skill shortages around apprenticeship schemes.*

It is recommended that the industry focus on apprenticeship schemes, as they value the ‘practicalhands- on approach’ of these schemes and the majority believe that this method is the best way to create quantity surveying and engineering skill-sets that will improve the industry’s workforce against these professions.

On the other hand, to safeguard the development of job-specific skills the industry needs to work on retaining their apprentices. To improve the retention of labour resources they must look at appropriate ways to improve the training and structure them accordingly. Through improving the quality of apprenticeship schemes, it is likely to increase motivational levels and encourage apprentices to continue with that specific career path.

Moreover, the industry needs to go back to basics, in the sense that they need to consider how to effectively attract younger people into quantity surveying and engineering roles, for them to even consider the option of an apprenticeship scheme. To achieve this, it is advised that the industry evolves and moulds itself with the current modern world. Approaching the situation this way, will make the industry more attractive to the younger generation, as it will become something that they can possibly relate to; therefore, increasing awareness of these job roles to hopefully lead to greater apprenticeship enrolments and completions.

This study recommends further studies around the area of ‘improving awareness’ and ‘changing perceptions of the young’ professionals in the industry. Educating young people about the wealth of opportunities and career paths available will help incentivise them to consider a career in the industry. With careers in digital technology being an increasingly popular choice for young people, modernising construction techniques will increase the appeal for young people that are prioritising forward-thinking and longer-lasting roles when choosing a career path. Perhaps a study which will lead to an educational workshop would be an ideal research future research output.

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