The effects of COVID-19 pandemic on the UK construction industry and the process of future proofing business

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Abstract

Purpose
COVID-19 was officially declared as a worldwide pandemic by the World Health Organisation (WHO) on March 11th 2020, before the UK was put into lockdown on the 23rd March 2020. Organisations had to reconsider their policies and procedures to allow their businesses to continue. This paper focuses on the effects of COVID-19 that the UK construction sector has had to undertake to enable businesses whilst employees had to adhere to COVID-19 lockdown rules. In addition, how the sector can positively continue once normality has returned within the industry. In doing so, this paper understands the historical issues within the construction sector and have had an effect during COVID-19.

Design/methodology/approach
A qualitative research methodology approach was taken to help obtain live information. In total, 19 semi-structured interviews from 15 organisations related to the construction sector were conducted to collect data. This information was evaluated using thematic analysis to arrive at the results, inferences and recommendations to the sector.

Findings
This research has revealed that companies have had to adopt a three-stage process to overcome a new dimensional challenge of COVID-19. These include:

1. Making quick decisions during the first stage of the pandemic.
2. Producing new policies and procedures to restart businesses enabling staff to return to workplace safely.
3. Implementing methods to future proof organisations against any potential pandemics.

To help organisations to future proof their business five C's are recommended.

Originality/value
This paper provides a rich insight into the understanding and awareness of the effects of COVID-19 and the changes that the construction sector has had to undertake in order to adhere to the lockdown rules whilst remaining productive. This research contributes towards informing policymakers on some of the lessons learnt during the management of the COVID-19 pandemic from a construction sector perspective.

Keywords: COVID-19, impact, construction sector, skills shortage, cultural change, social distancing, and lock down.

Introduction

Kramer (2020) and Li *et al*., (2020) explain COVID-19 has brought immediate unprecedented change to many construction companies and their workplaces. The pandemic has drastically changed the way we work, communicate and socialise, leaving the world with significant daily changes that would need to be measured on an extraordinary scale and has therefore led the UK into financial recession. Organisations have been faced with increased talent management issues. Fischer *et al.,* (2020) support this, explaining that the pandemic has ignited entrepreneurship in organisations overcoming the barriers that companies have faced and enabled companies to continue with their usual business, whilst understanding the best methods to enable them to carry on trading.

However, the sector was already suffering from a multitude of issues such as skills shortages, talent management issues, housing shortages, poor mental health and wellbeing management, health and safety, poor diversity within the sector and lagging behind other industries implementing industry 4.0 strategies. Thomson *et al., (2021)* explains that many of these issues have been inflamed due to the pandemic but acknowledges that this is the right time for the industry to resolve these issues as the sector begins to return to normality. Therefore, due to the drastic changes the pandemic has enforced on businesses and employees, this research explores the effects of the COVID-19 pandemic on the UK construction industry and the process of future proofing businesses. This is done, by obtaining live information to understand the changes that the construction sector has had to undertake in order to adhere to the lockdown rules, whilst being productive and proceed in investing in digitalisation.

Organisational crisis has proven to be a major factor for businesses within the construction industry and Assaad and El-Adaway (2021) claim that there are six main issues that have impacted the industry and therefore, must be explored. These include, delay and suspension, cancellation, supply chains, additional risk, labour and capital which all relate to the general issues within the sector However, the holistic organisational crisis issue incorporates wider issues. Further to this the UK Government and some construction bodies' whom have published reports such as the Egan report, Latham report, Fairclough report and Farmer Review suggest that prior to the COVID-19 pandemic there were a multitude of underlying issues that were preventing the sector from maximising its potential due to skills shortages. The Royal Institute of Chartered Surveyors (RICS, 2020), have committed to reviewing their policies within the construction sector to encourage potential construction workers to join and remain in the built environment, employees mental health and wellbeing, a national housing shortage, increasing build costs and the lack of business' utilising industry 4.0, which could be a potential solution to many of the issues within the sector.

Carnevale and Hatak (2020) and Li *et al*., (2020) agree that the first challenge came with the sudden change in our place of work. The possibility of working from home using flexible working policies, has typically been used by companies to attract talent, as it appeals to prospective employees. Some companies are more adept than others by continuing to work effectively but are still hampered by other organisations that delay their free-flowing motivation, removing efficiency, productivity and value for money whilst inevitably increasing the skills shortage. Further to this, many reports explain that the issues within the sector have been inflated due to the pandemic and therefore, digitalisation could become even more important, enabling companies to build with greater value for money and increasing long term social distancing.

To assist with this study a multitude of documents were reviewed to help understand where the research gaps were. Gathesgar *et al.,* (2021), Kraus *et al.,* (2020) and the World Economic Forum (2020) discuss the importance of digitalisation and upskilling the workforce that will help the construction industry advance during and post Covid-19 pandemic. Wilson and Barton (2020) discuss the historical issues within the house building programme that relate to delays and a housing shortage and this further relates to Oskeser (2020) and Alaloul *et al*., (2020) views on industry 4.0 and improving prefabrication and a multitude of government publications that relate to skills shortages.

Research Implications

The research study intends to increase the knowledge of both academia and the construction industry. This study understands a multitude of historical issues within the sector and combines them with the impact of COVID-19. This helps determine methods of working that resist organisational crisis and help improve the efficiencies of the construction sector, but also advising businesses to help future proof their organisations and improve employee's welfare.

Theoretical background

The Coronavirus pandemic has brought immediate unprecedented change to many construction companies and their workplaces. The pandemic has drastically changed the way organisations and employees work, and therefore, senior managers are having to understand how to strategically continue with their current resources whilst attempting to plan for the future. However, prior to this, there was and still is a multitude of significant issues including but not limited to a national housing shortage, industry 4.0, mental health and wellbeing, skills shortages, organisational crisis and now due to COVID-19, cost inflation has been heightened. Therefore, Thomson *et al., (2021)* explain that the pandemic has produced an opportune moment to overcome many issues within the sector and improve upon them. They explain that this includes sustainable transitions, urban regeneration, smart cities and digital construction and organisational crisis.

Housing Shortage and Urban Regeneration

In 2018 the Mayor of London, Sadiq Khan, reported that he would be using his planning powers to deliver more new and affordable homes. During his first year in office, the Mayor published 'The London Housing Strategy' guidance introducing a pioneering new approach to securing affordable homes through the planning system, which, for the first time, links directly with his investment powers. Further to this, The National Housing Federation (NHF), (2019) claimed that the UK Government must invest £12.8bn each year over the next decade whilst building 1.45 million social homes to catch up with the housing deficit.

However, Wilson and Barton (2020), explained in a recent report that the UK construction industry must increase its house building programme by 24% by the mid-2020's to keep up with the housing demand and are not matching predictions that have been made over the past decade. In 2018-19 the construction industry only built 241,000 properties, 59,000 behind the government target, and Wilson and Barton (2020) explained that there are barriers that the sector keeps fighting against. These include issues purchasing land, local planning authorities, infrastructure funding, support for Small to Medium Enterprise (SME) developers, a lack of skilled labour which has been worsened due to Brexit, increasing build costs and not moving forward with technology. Therefore, the sector must overcome these barriers. However,

COVID-19 has further prohibited construction works by closing construction sites, and reducing permittable staff to return to work, allowing working environments to stay safe and this has significantly delayed the 2020-21 house building programme through all stages of construction.

Industry 4.0

The UK Government (2013) confirmed that two-thirds of construction contracting companies are not innovating at all, as they face barriers in the sector, which include procurement restrictions, lack of confidence and commercial risk. Alaloul *et al*., (2020) and Oskeser (2018), feel that the construction industry lags behind other sectors and are not adopting new technology, making the sector inefficient, and Gathesgar *et al.,* (2021) and Oskeser (2020) further explain that the sector must manage a lean innovative process to enable the built environment to adopt industry 5.0. Many companies do not have available capital to experiment with innovation and there is a failure to learn and evolve successful innovations and the collaboration between industry, academia and research is poor and this limits knowledge transfer. This displays inefficiencies in organisations' ability to manage talent appropriately and not fulfilling employee's potential and upskilling them, which would be beneficial to the company, are stagnating whilst falling behind the technological advances of other UK sectors. The UK Government's Construction 2025 (2013) document stated that change is required in the construction industry itself and shows how the construction industry is perceived by the public, continuing to explain that industry and Government must work together to inspire young people. Further to this the Farmer review (2016) set out a series of recommendations regarding talent management in the construction industry. This included recommendations regarding digitalisation within the sector stating:

"Industry bodies and professional institutions should also take a more active role in ensuring that training courses are producing talent, which is appropriate for a digitally enabled world, making sure that the right business models are evolved with appropriate contractual frameworks".

There are many positions throughout the construction sector that will always require employees, however, due to the never-ending skills shortages within the sector it is imperative that the construction industry moves forward maximising potential employees, businesses and the sector. Further to this, it allows products to be constructed in Covid-19 secure factories, transported safely to sites and installed insitu using minimal and socially distanced labour, sites to be surveyed remotely and employees to gain site access through revolving gates by using mobile phone applications (apps) such as M Site. These are a few of many examples showing how the sector can improve whilst implementing a greater use of IoT, robotics and automation that will allow not only greater site efficiencies but safer sites through social distancing and less employees to complete a task (Kraus *et al., 2020)*.

Garcia *et al.,* (2019), explains that there is no question that industry 4.0 will have a profound impact and will disrupt jobs. Wilson & Barton (2020), further explain that innovation in construction methods and materials can mean more homes being produced quickly, cost-effectively and to modern standards. Among other things, this can increase the lifespan of housing, improve energy efficiency and reduce the need for major repairs. The UK construction

industry has been accused of being slow to adopt technology and other innovations which are frequently used by house building industries in other countries. These innovations include an increased use of data and data management to design and build houses, using technology to manage the standardisation making the programmes more efficient, having mass produce modular components, reducing time and improving quality whilst using less manpower.

Skills Shortage

The construction industry has a long-standing issue with skills shortages throughout the sector. The government has recognised that by commissioning senior professionals to investigate the skills deficit in a multitude of reports including the Simon report (1944), the Banwell report (1964), The Latham report (1998), the Egan reports (1998 & 2002), Construction 2025 (2013), the Farmer review (2016) and most recently the Industrial Strategy Construction Sector Deal (2018). However, the built environment still suffers from a lack of skilled workers, from builders and plumbers, to quantity surveyors and architects. There are many reasons for this including; the younger generation not joining the industry, women feeling they are being discriminated against, poor mental health and wellbeing due to the stress and workload pressures, older generations retiring from the sector, the built environment not accommodating disabled applicants, intersectionality, and the reputation of health and safety within the industry. Many believe that the industry still suffers the 'man's world' reputation where health and safety standards are not taken seriously, women are not welcome, 'foreigners' do the unpopular jobs and apprentices make the tea, a reputation that the sector has historically earned.

The Industrial Strategy (2018) and the Farmer Review (2016) set out standards to improve the skills shortage issues. This was to be done by supporting and implementing the Construction Industry Training Board (CITB) reform plan whilst identifying current and future skills needs, training and progression routes, set standards, fund construction training and promote the industry, improving the number of apprenticeships and strive to increase diversity of the sector, with regard to gender, ethnicity and disability, and to actively promote construction careers across society. However, Wilson and Barton (2020) claim that the industry is still behind the target of 157,000 new recruits by 2021 and it is imperative that the recruitment is increased to keep up with construction demands. In contrast with this Carnevale and Hatak (2020), explain that organisations have to contend with unprecedented human resource management (HRM) challenges, striving to find solutions to the rising challenges that the workplace faces. However, skills shortages will increase in a volatile construction market during the Covid-19 pandemic which has led to uncertainty for many employees and could see employees seek positions in more stable sectors.

Organisational Crisis

Kraus *et al.,* (2020) explains that organisational crisis has a wide variety of definitions, and does not always have negative impacts on an organisation, as it can lead to positive approaches from companies by innovating, enabling businesses to move forward in the industry creating efficient solutions which enhances the talents of their employees. Further to this Carmaeli and Schaubroeck (2008), explain that organisations are not prepared for disaster management and rely on learning from poor experiences rather than having a proactive approach and, the top management team needs to build up a repertoire of responses that will ensure the organisation's viability under all plausible circumstances. This theory has been proven whilst organisations are fighting against the economy during COVID-19.

Heyden *et al.,* (2020) explains that the automatic response by organisations is to downsize the workforce and this is often a kneejerk response whilst reducing their costs by 50%. Heyden *et al.,* (2020) further explains that companies who are downing tools and furloughing staff will struggle to get back up and running when the dust settles and, applauds organisations who have been innovative to continue with their business'. Organisational crisis also has a profound effect on both individuals and groups within a business, causing stress related illnesses. Loosemore (1998), explains that stress only has negative impacts on individuals and described the association of crisis and stress as a 'stress producing stimulus' and 'generic problem that poses severe threats to crisis management', this explains the importance of teams being proactive negating future issues that will threaten them.

Mental Health & Wellbeing

Stevenson and Farmer (2017), explain that despite the stigma that surrounds mental health there are more people at work suffering from these conditions than ever before. 300,000 people with long term mental health issues lose their jobs each month and, 15% of people within the workplace have symptoms of existing mental health conditions. This is a huge cost to employers of approximately £33 – 42 billion per year. It is argued that this money, if spent on mental health sickness could be reinvested into the workplace and if so, the workplace could conquer mental health issues. This would enable employees to achieve a greater wellbeing within the workplace, enabling them to become more productive, therefore, allowing talent management to become more simplified. COVID-19 has further added to mental health issues, as Public Health England (2020) revealed that 84.2% of the UK public are worried about the effects to their health from COVID-19. The construction industry is currently suffering from skills and housing shortages, with many workers leaving the industry due to mental health illnesses and Otterbah *et al*., (2019), claims that there is a huge link between working hours and mental health issues. Otterbah *et al*., further explained that whilst people are happy to work extra hours when necessary, it has a personal impact when over employment is constantly expected and influences their personal lives.

Oswald *et al*., (2019), explains, that whilst lean construction has improved general health and safety in the construction industry, not enough research has been completed on mental health and therefore, lean construction has had a negative effect. The construction industry is particularly vulnerable to mental health issues, as the environment contains many occupational stressors such as: high production pressures, dangerous work, complex decision-making and 'not feeling tough enough', all of which can contribute to poor mental health. As a result, the APPG (2020) and Caligiuri *et al.,* (2020), displayed concerns with mental health and wellbeing issues within the workplace, clarifying that the Government should work with different industries to produce and promote mental health guidance for employers. This work should also include recognising the causes of mental ill health including sexism and other forms of discrimination, and, running education programmes for employers on how to support employees.

Health & Safety

Health and Safety has always been a major issue within the construction sector and has deterred generations of potential employees from joining. The Construction Youth Trust (2019) revealed that 27% of young adult's parents claimed that parents would actively discourage them from joining the sector due to the poor stigma. This stigma has affected the industry for

decades, due to the poor reputation, salaries and health and safety issues that have been part of the sector. Stiles *et al.,* (2021) explain that the industry employs over 2.4m people and is worth over £100bn to the UK economy. However, due to the complexity of working arrangements health and safety issues have been inflated due to COVID-19 as sites have had to adjust to social distancing measures, implementing new hygiene and personal protective equipment (PPE) measures, and accommodating a greater level of working from home for roles that are not essential to front-line work. COVID-19 has had a mixture of negative effects on health and safety which include COVID-19 being a poor distraction on current health and safety issues, reduced resources and general wellbeing, however, positively it is pushing the health and safety agenda, work redesign and industry 4.0.

Cost Inflation

The RICS (2019), claim that tender prices are expected to rise by 27% between 2019 – 2024 due to increased salaries, material costs and professional fees. Cost increases have been a long-term issue for the construction sector, especially since hitting a low point in 2016 where costs have been rising ever since. However, the RICS believe this prediction has been driven by a very strong growth within the infrastructure sector and there is still uncertainty over the terms that the UK Government have agreed with the European Union (EU) and what the implications of Brexit will be. There are a multitude of construction organisations including Faithful and Gould (2020), Turner and Townsend (2020), and Arcadis (2020), claiming that there will be significant price rises in the construction industry due to the coronavirus pandemic. Arcadis claimed that construction costs are constantly increasing in the UK and London is the most expensive city in the world to build in. However, they further claimed that the increasing costs could be inflated further, due to COVID-19. Turner and Townsend (2020) claimed that productivity has been reduced by 35% on construction sites, leaving businesses with spiralling costs but commented that "by embracing modern methods of construction, the COVID-19 impact on resource levels can be mitigated by taking processes off site." Furthermore, Faithful and Gould (2020) claimed that PPE costs have already increased as demand has rocketed, and provision of welfare units could witness the same supply and demand pressures. Faithful and Gould further revealed that some estimates display that companies have seen a £2500 per week rise on their construction costs to comply with COVID-19 guidelines. These inflated costs will have a huge impact on the sector and could see businesses fall into liquidation leaving many employees without a job.

All of the issues described have been major issues within the construction industry prior to COVID-19, which all conclude as issues within talent management, finance and health and safety for organisations to improve and resolve. Talent management issues have included, rising costs, upskilling labour to enable employees to be digitally skilled, issues with obtaining skilled labour and mental health and wellbeing issues that have prohibited organisations from keeping up with the governments housing building targets to reduce the housing shortage and many other significant projects. These issues have now been inflated due to COVID-19 and the UK falling into financial recession. This means that talent management has taken a new route as organisations must continue whilst enabling employees to work remotely, considering a furlough scheme, socially distancing, increasing employees PPE and communicating effectively with their staff.

UK Recession

The UK fell into recession that was reported to be the deepest recession of any major economy by Mark Thompson of CNN (2020) and was proven by the gross domestic produce (GDP) reducing by 20.4% in the second financial quarter. Despite the Office of National Statistics (ONS) (2020) announcing that the construction industry had widespread growth in June 2020 due to businesses' managing to operate whilst adhering to social distancing measures, Construction News (2020) revealed that there has been a 25% reduction in construction throughout the year. It is expected that private housing, commercial, repairs, maintenance and improvements will be the worst hit areas of the construction sector affected. This will lead to fading job security and rising unemployment, falling incomes and unwillingness to commit to large purchases' or loan repayments to finance them. This will then lead to further mental health issues and senior managers having to review policies and procedures to ensure organisations continue with their businesses.

COVID-19

On March 11th 2020, exactly one month after naming the coronavirus disease 'COVID-19', the World Health Organization (WHO) officially declared a global pandemic (WHO 2020b). At the time of writing, over 500,000 deaths have been reported globally with almost every country in the world having at least one laboratory confirmed case. (WHO 2020c). Li *et al*., (2020) explains that COVID-19 has brought immediate unprecedented change to many construction companies and their workplaces. The possibility of working from home using flexible working policies has typically been used by companies to attract talent as it appeals to prospective employees however, it has now become a long-term necessity to allow businesses to continue.

Coe and Jones (2010), explain that the recession in 2008, had a devastating effect on the UK construction industry, and now Fernandes (2020), fears that there could be a worldwide economic recession. Fernandes (2020) further explained that typically the world shares the economic recession risk, helping minimise the impact. Further to this Kraus *et al.,* (2020) explained that many countries' governments have taken drastic measures affecting the daily life of society. This has meant that there have been significant economic consequences across the world, continuing to clarify that stock markets have crashed dramatically with economists forecasting harsh recessions. Fernandes supported these comments explaining that due to the COVID-19 pandemic, countries are more isolated and will have to fend for themselves revealing that the UK's Gross Domestic Produce (GDP) could drop by up to 4.5% leaving the UK at high risk of a recession which will inevitably impact the construction industry.

The background displays historical issues which the construction industry has been battling against for decades. This included the housing shortage, Industry 4.0, mental health and wellbeing, cost inflation and skills shortages which have been have been further inflated due to the volatile market and other issues have now been raised which the sector also needs to fight against. Therefore, as described by Thomson *et al., (2021) this is the right time to have a* collaborative approach within the industry to overcome the current issues within the sector by following the recommendations from this research.

Research methodology

Research approach and strategy

Qualitative research methods provide an appropriate approach to dealing with work contexts change and the complexity of large-scale organisational change (Garcia and Gluesing, 2013). According to Creswell and Creswell (2018) the purpose of qualitative research is discovering and understanding meanings by an individual or group, for a problem or an issue. Wisker (2008) noted that qualitative research is carried out to understand meanings, interpretations, and/or to look at, describe and understand experience of people involved in the given context. Franscati (2015) explains that research and experimental development comprise of creative and systematic work undertaken to increase the stock of knowledge, including knowledge of humankind, culture and society to devise new applications of available knowledge. Subsequently, due to the minimal research around COVID-19, a qualitative research methodology was adopted.

Authors such as Robbins (1994) and Murry and Hammons (1995) noted that the suitable number of experts for the qualitative research may range from 5 to 50. Henceforth, primary data for this study was achieved by completing seventeen semi-structured video conference interviews from fifteen organisations related to the construction industry and a further two interviewees who had lost their jobs due to the pandemic (See Table 1). Interviewees were sent an invitation letter that provided information about the research, the ethical aspects of conducting online/virtual interviews, and the benefits of participating.

Data collection methodology

The nineteen semi-structured interviews were based on eleven questions to understand what changes were being made throughout different organisations, what the improvements were and what learnings could be transferred to other businesses. On this basis interviewees were asked to summarise the organisations the interviewees are employed by and their roles within the organisation, how the organisation had been affected by the pandemic, what measures the company have implemented, what challenges both the individual and organisation are facing, how organisations are supporting their employees and how the interviewees think that organisations will change in the future. Gruber *et al.,* (2018), explains that semi-structured interviews allow the interviewee the opportunity to offer an opinion and elaborate on their experiences. Saunders *et al.,* (2019) explains that there is a critical importance to sampling, enabling a pre-determined number of interviews to be selected from a large population to obtain reliable responses that represent the research area. This entailed interviewing 19 interviewees that represented the construction industry during the COVID-19 pandemic using a purposive sampling technique (Teddlie and Tashakkori 2010).
The study sample included a multitude of positions including directors, managers, surveyors, construction recruitment agents, marketing co-ordinators and tradesmen that work within the construction sector. This enabled a full perspective from all levels within the sector, to gain a true understanding of how changes were being implemented, and how the changes were affecting employees throughout the staff pyramid. The interviews lasted between 15-20 minutes. The format of these interviews was transmitted through video conferencing to fully understand ‘The effects of the COVID-19 pandemic on the UK construction industry and, the process of future proofing businesses.

Data analysis methodology

The analysis of the interviews was undertaken using thematic analysis as Jevadi and Zarea (2016), claim that thematic analysis gives the researcher extra flexibility and help both

reflecting and clarifying reality, and subsequently, there is not a minimum amount of interviewees that are required for a study. Therefore, in this study, coding of the transcribed interviews involved open coding of meaning units, that is, words, phrases, sentences, paragraphs, which essentially involved labelling concepts. Following this, the concepts were organised into themes that were cross checked between the discussions and authors. Issues with validity were minimised through triangulation of data collection methods (interviews, observations, internal and external documents) and verification of the initial thematic codes by participants, where they judged the accuracy of data collected, though not its conclusions (Tajeddini and Mueller, 2009).

Please insert Table 1 here

Findings

The current study reveals that the construction sector contains many different parties and underlying issues and therefore a breakdown of how COVID-19 has impacted follows.

Management Team

All interviewees claimed that site works had slowed down and subsequently were making a loss as it was costing more to run the sites than progress was earning. However, one Director explained that COVID-19 was having a huge impact on her and her employer. When she was asked about policies and procedures and if companies had policies in place for disaster scenarios she explained that she had worked for multiple housing associations and "they always had disaster management procedures" which included pandemics. However, this pandemic has brought a new unknown dimension where the use of industry 4.0 has become prevalent and has temporarily changed her workload to work with the executive team ensuring the business has a good understanding of the policies that are being implemented. Another interviewee who is Head of Department, claimed that the stress was becoming unbearable due to the increased responsibility, explaining that a personal challenge was the "*increased levels of work, particularly phone calls and emails. Working from home means you are constantly accessible, whereas, when you're in the office you go to work and then go home. There's now a line in the sand where that is not the case any more,"* further explaining that "*I'm sat at a desk where I'm at a meeting, whilst being contacted about my work and personal phones as well as the online chat through teams and emails are still being pinged through. It's just too accessible*." This was confirmed by a Director explaining that the use of technology has become more important enabling her to work remotely and still enabled her to communicate with her team. However, there was also a negative as she explained that one off chats with the wider team, whilst making a coffee and building relationships has been removed and the wind down when she drives home from work has naturally stopped. Therefore, working from a homemade office, straight into family life has a poor mental effect. This Director felt that there is a lot of learning to be taken into account from the current situation, and one of the most important things is to improve technology so that staff could have virtual coffee mornings and the wider team could be involved.

Recruitment

2 interviewees work for national recruitment companies where COVID-19 has impacted their positions and potential candidates applying for other positions. One interviewee explained that COVID-19 has impacted their workplace in a multitude of ways and the main issue is that she

works on a government grant programme to help unemployed search and apply for careers, and explained that:

"We have had less referrals to the programme from Job Centres and have been mainly relying on our social media drives. I feel that this is due to job centre coaches not being able to meet their new members and being able to direct them to us for support".

This displays that technology and COVID-19 have had a negative impact as many people still rely on face-to-face interaction and in this instance potential employees still do not use technology to enhance their careers.

Another recruitment consultant explained that he still has to travel and work in an office every day as the company do not have the ability to work remotely. This issue is further heightened as agency employees still try and access the office as they do not have the ability to complete time sheets and job cards remotely but worry about their weekly salary. This company is now investing in new technology to allow both employees to work remotely when necessary and training agency candidates to use technology enabling them to complete timesheets remotely.

Project Team (Surveyors, Project Managers, Marketing, Site Managers)

All interviewees explained that their employers had been very supportive, ensuring that staff had the ability to work remotely and safely and one interviewee explained that his former employer during the first lockdown *"wrote a managers guide to keep in with the workforce and took it very seriously."* However, whilst most of the respondents have the ability to work remotely their programmes and projects have been delayed due to sub-contractor issues, material deliveries, lead times and other influencing parties. Subsequently, this has implicated cash flow and programmes, where companies now have to re-profile their accounts and one organisation have announced that budgets will be reduce by £3 million from April 2021.

69% of the interviewees stated that employers have invested in enhanced technology purchasing laptops, phones and tablets allowing staff to work remotely, enabling staff to build a trust with employers proving that remote working could be utilised long term. However, only two interviewees stated that budgets had been given to employees to purchase home equipment and one interviewee stated that she finds it difficult to print essential legal documents due to the offices being closed, and when asked if her organisation would buy her a printer she stated "*I've asked but no, everything you want, you have to beg for practically, which isn't ideal. A lot of people have problems with their internet and there are boosters which the company could purchase, but they won't, so people are just struggling at home. People are having to change their homes around and buy desks, but the company won't help."*

Whilst some companies have the ability to work remotely and COVID-19 has not affected their usual working methods on a day-to-day basis, some other parties do not have the same ability and therefore, has had a knock-on effect. One interviewee explained that:

"The whole business is now 'working from home'. We have also found that some regions/councils have not been setup to work remotely, therefore planning application decisions have been delayed".

Conversely one site manager explained that he is still operating from a building site but has had to work with his company to implement new measures to comply with the Government

guidance and the Construction Leadership Councils (CLC) site operating procedures, ensuring that staff are travelling to and from site safely, meanwhile extra welfare facilities and staff can work safely onsite whilst maintaining a 2m gap from other tradesmen.

All interviewees explained that their office facilities will change upon returning to work, detailing, that one workplace will adopt new policies. Some examples include maximum numbers using facilities such as the toilets, kitchens and printers, reducing desks, erecting perspex barriers and prohibiting hot desking to reduce the rate of infection. One interviewee claimed that his company has *"supplied PPE hampers to allow us to attend site"*. These have all been delivered to all employees' properties, so they do not have to attend offices to collect them.

Tradesmen

2 interviewees are tradesmen who have both been affected by the COVID-19 pandemic. One interviewee explained that he was furloughed immediately but was worried for his job when the economy is fully running again. He further explained that the majority of his employers' work includes electrical maintenance work for fast food companies but worried that work would slow down due to a prospective recession. One other tradesman explained that he is being furloughed for three weeks and would be working for three weeks on and off. This has enabled his employer to plan works ensuring that only emergency works are ongoing but all other programmes have temporarily stopped. Whilst only emergency works are being completed, he explained that tenants are still phoning up complaining that their works should be completed as immediately, even though when tradesmen are arriving at the property the works would not ordinarily be classed as an emergency and could have been postponed to a later date.

Skills Shortage and job termination

The ONS (2020) revealed that construction output fell by 40.1% from April – June 2020 coinciding with the Guardians claim that up to 500,000 jobs could be lost. Further to this, one recruitment agent explained that the skills shortage will worsen as 75% of their agency staff have lost the positions and this culminating with a prospective recession has led to some of their contracted employers terminating their businesses. 2 interviewees have lost their positions. 1 interviewee was a site manager working on a temporary basis but lost his job as soon as lockdown began on 23rd March 2020. The other interviewee was due to start a new position on 6th April 2020 after he had worked his months' notice. However, his contract was terminated prior to him starting his new job and his current employer would not offer his old position back. This left both interviewees with significant financial issues where neither of them had regular incomes.

Four organisations explained that there were some employees who were furloughed, however some staff were redeployed to undertake other duties such as cleaning and marshalling, which enabled the organisation keep offices open to a limited number of employees and stopped visitors attending residential properties to help the residents stay safe.

Industry 4.0

Construction 2025 (2013) explained that two thirds of construction contracting firms are not innovative and subsequently halting technological progress within the sector. This is now

prevalent, having a negative impact as many site products could have been prefabricated in factories using robotics and automation whilst using less labour ensuring that products are being built in a safe environment and installed onsite in accordance with social distancing measures. However, one interviewee employed as a site manager claimed that pre-fabrication is not used effectively, and the company do not use modern methods of construction regularly but claimed that it would allow sites to become more efficient and explaining that using pre-fabricated products would enable social distancing in the factories and on construction sites and would improve future working methods onsite.

Mental Health & Wellbeing

At a global policy level (WHO 2020), WHO's Global Plan of Action on Worker's Health (2008-2017) and Mental Health Action Plan (2013-2030) outline relevant principles, objectives and implementation strategies to promote good mental health in the workplace. The CIOB (2020) suggest the most common mental health issues felt in the year 2019 for the industry were stress (97%), followed closely by fatigue (96%), and poor concentration (95%). 62% of the organisations in this study claimed that mental health and wellbeing issues have increased due to the coronavirus pandemic. Two interviewees explained that they think mental health issues will increase as people are not physically contacting each other and will have an increased impact on those who are not used to working from home. Another interviewee commented that it is a struggle to keep in contact with the wider team, who she would see daily, and commented that video technology could advance further to have 'coffee mornings and drop-in sessions' instead of constant formal meetings to allow people to catchup in an informal manner. However, five interviewees including the interviewees who are on furlough claimed that they are worried about their jobs due to the current financial and health climates and worry about the livelihoods of their families. However, positively one interviewee claimed that her company has a team meeting at the start and end of each day so that staff can catchup discussing both work and personal related issues.

Overall findings have proved that companies are having to battle with COVID-19 using a three-stage process which includes:

1. Initially they are operationally firefighting battles to make quick decisions regarding furloughing staff, remote working, targeting specific works and how to continue with business operations.
2. Implementing new measures to help employees continue with their work, how the office can be adapted to allow staff to return to the usual workplace whilst there is still a risk of a second wave and ensuring remote staff are working safely.
3. Strategically implementing new measures, policies and procedures to future proof business from future risk.

Overwhelmingly, all the interviewees explained that their companies had been affected by the COVID-19 pandemic, ensuring that staff are well informed and have the relevant equipment to work remotely, and some companies have shown further support by ensuring that staff are completing Display Screen Equipment (DSE) assessments to ensure that they are working safely. Unfortunately, during the first stage, staffs have lost their jobs, companies have to analyse their cash flows and there are project delays due to material supplies, a shortage of contractors and other parties not having the ability to work remotely.

Companies now have to adapt to new methods of working, by introducing new measures. Currently many employees are working remotely using laptops and phones to dial in to video

conferences to use both formally and informally. Now companies are preparing themselves for staff to return to offices by introducing one-way methods, reducing numbers to utilise welfare facilities, prohibiting hot desking, delivering PPE to employee's properties to allow them to attend site and increasing the use of remote working.

Finally, companies now have to plan on how they can future proof businesses against future pandemics. Two of the interviewees did not have the relevant technology to work remotely and could not work at the start of COVID-19. All the interviewees felt that technology would be improved throughout the workplace to ensure that staff could work safely away from the office. The UK Government recognised that in 2013 two-thirds of construction companies did not invest enough in innovation. One interviewee who is a site manager claimed that his company use very little prefabricated materials and thinks that this could be very beneficial to the construction industry to enable works to progress whilst safely social distancing.

Please insert Table 2 here!

Table 2 displays that all companies are working collaboratively to ensure that businesses can continue to keep themselves financially stable. Unfortunately, this has seen two employees lose their positions and two people have been furloughed, however, all employees admitted that their employers had kept in good contact with them. In conjunction with this, all employees explained that their employers were designing new policies and procedures to ensure that it is safe to return to their regular workplace. This links with Eun-A Kim (2020) who stated that workplaces must comply with the following protocol:

1. Strengthening employee hygiene management and maintaining clean and disinfected workplaces
2. Social distancing and isolation
3. Flexible working
4. Establishment of a protocol to detect suspected or confirmed patients in the workplace
5. Sick leave management for confirmed patients and contacts
6. Increased technology
7. Reduced travelling and cancelling unnecessary appointments

This shows that the interviewees workplaces changes and improvements are highly relevant and have similarities to workplaces across all industries.

69% of the companies have purchased new technology to ensure staff can work remotely to allow companies to attempt to continue with their businesses. However, in contrast, there are two companies who have had issues with other parties who have not been able to continue with elements of the business. One respondent explained that a planning decision had been delayed, however, to overcome this, they kept in contact with the local planning authority and the contractors, to jointly review realistic time scales and plan ahead. The other respondent explained that his company was struggling to obtain materials and having materials delivered. Therefore, to overcome this the company were purchasing materials from alternative suppliers, picking up materials when necessary and reviewing pre-fabrication options where possible.

Health and Safety has been a key issue during the COVID-19 pandemic, and Simpeh and Amoah (2021), explain that increased health and safety measures are essential both on site and in communal areas, such as offices, toilets and canteens. All of the interviewees who are still employed claimed that offices and communal areas were now safe areas which allowed for social distancing and sanitisation, however, only two interviewees explained key implements

to help employees. One interviewee explained that his company was delivering specific PPE kits to employee's houses/properties to ensure that staff can safely visit site. The other interviewee explained that their company had emailed all employees a DSE self-assessment form to ensure that they were working safely at home.

COVID-19 Workplace Challenges

COVID-19 has meant that organisations have had to face many challenges since the WHO announced that there was a global pandemic and are still facing many challenges. There are six key challenges which include the following:

1. Flexible working: Flexible working has often been a method of attracting new employees and offering flexibility to allow managerial and office-based staff to have a more convenient personal lifestyle. However, organisations have been pressured to invest in new technology to enable all staff to be able to work remotely. However, only two interviewees have been given a budget to purchase extra equipment to allow them to work safely. Conversely, some organisations have not had the ability to work remotely, this has affected the progression within other organisations.
2. Job termination: Unfortunately, job termination and ONS construction output statistics strongly complement each other and due to the GDP reducing, many people have lost their positions even with the government incentives that were set out at the start of the lock down period. This also strongly relates to the skills shortage and housing deficit, where evidence is displaying that the construction labour market is reducing and potentially joining other sectors.
3. Industry 4.0: The construction industry is notoriously poor at adopting new technology. Some sectors are now beginning to adopt industry 5.0, however, the construction industry is lagging behind and realising this whilst attempting to progress on site. The sector is now challenged to invest in new innovative methods to allow greater efficiency onsite, helping to improve long term social distancing and develop talent management.
4. Site practices: The CLC challenged construction sites to improve the whole site regime to enable site teams to understand how tradesmen are travelling to and from site, improving access and egress points, introducing one-way systems and purchasing extra welfare facilities whilst maintaining social distancing. Reports display that this involves other challenges such as increasing construction costs and a greater need for pre-fabrication as social distancing is proving to be difficult due to manual handling procedures and sites are progressing with a minimal effect due to having a skeleton work force.
5. Office workspaces: Many businesses are working remotely, however, this is providing many issues for employees which most importantly includes the effects of mental health and wellbeing. Offices are now being challenged to improve the working environment to facilitate employees to return to their usual workplace. However, policies and procedures are having to be designed to enable a safe workplace enabling staff to feel safe in their working environment.
6. Mental health and wellbeing: Research completed in 2017 by Stevenson and Farmer, found that the UK economy spends between £33-42 billion, 300,000 people with long term mental health lose their jobs each month and 15% of people within the workplace have symptoms of existing mental health conditions. WHO (2020) reported that depression and anxiety have a significant economic impact; the estimated cost to the global economy is US$ 1 trillion per year in lost productivity. For every US$ 1 put into scaled up treatment for common mental disorders, there is a return of US$ 4 in improved health and productivity. This existing challenge has now become even more

prevalent because of COVID-19. Employees are now worried about the disease itself, are feeling excluded and lonely as they cannot attend their usual workplace and are naturally feeling anxious about job security. This is proving to be a huge battle for the workplace, and Caligiuri *et al.,* (2020), explains that huge investment is immediately required to improve the mind-sets of many worried employees.

The historic issues within the construction industry have now increased due to COVID-19 where organisations have to maximize the efficiencies of their resources. However, this could have a positive effect on the industry enforcing companies to become more innovative and enhance industry 4.0. The issues within the sector intertwine and therefore by reducing issues within a single area will consequently help other issues such as greater talent management and upskilling, increasing digitalisation, cost efficiencies and mental health and wellbeing. However, it is also imperative that organisations strategically learn from the pandemic, whilst utilising a proactive nature to future proof their businesses. Further to this, the 2020 recession will create new problems for the industry, creating a new agenda to battle against, however, the sector has earned previous experience from the financial recession in 2008 that will help the sector plan and take a proactive approach to maintain a stable mentality whilst overcoming a multitude of challenges.

Conclusion and Recommendations

COVID-19 has changed the way we work and how businesses operate and therefore studies into how businesses have had to adapt have been pivotal to help guard against radical change against future pandemics and organisational crisis. There are a culmination of issues that the construction industry is battling against due to the coronavirus pandemic but this research also takes in to account the historical issues that have been inflated due to the pandemic within the sector that enables a collaborative approach to help move forward and progress collectively. Therefore, by completing a literature review of current research and interviewing construction workers that provided live evidence of the issues and adaptations within their organisations this study has reviewed the barriers of Covid-19, organisational crisis, pre-fabrication, industry 4.0, skills shortages and job termination, the UK 2008 recession, mental health and wellbeing, health and safety, cost inflation and the UK housing shortage. Subsequently this research has completed its aim to understand the historical issues within the sector, the impact COVID-19 is having on businesses and employees and concentrates on the changes that the construction sector has had to undertake to enable businesses and employees to adhere to COVID-19 lockdown rules and how the sector can positively continue once normality has returned within the industry.

Once all information was reviewed and analysed the data collection was complete which enabled an all-round perspective of the industry could be concluded. The research found that there are serious issues within the industry, and the research suggests that a more diverse workforce could have huge benefits to produce new technology, reduce the skills shortage whilst building more homes. However, it was suggested that the industry needs to provide greater working conditions for both current workers and to entice people to join the sector by offering remote and flexible conditions, greater health and safety environments and upskilling the current workforce. This will allow programmes to be reduced causing less delays and saving longterm costs.

The information also showed that organisations must invest in a greater use of technology as interviewees felt this would have a positive impact making whilst working remotely but also

explaining that a greater use of pre-fabrication would reduce programmes and create safer working environments as materials would be manufactured in factories and it would enhance social distancing on site.

It was understood that industry 4.0 could also have a positive impact on mental heath and wellbeing as a greater use of technology would help with colleague interaction with the use of initiatives such as virtual 'coffee mornings'. Further to this, interviewees claims that organisations need to invest further to help fight against mental health and wellbeing issues within the workplace and it benefits and employees and improves the morale within businesses.

The following recommendations are drawn for the Government and the construction industry to rethink and act on the following aspects to help employers and employees safely adapt to workplace during and post-COVID-19 outbreak whilst understanding the historic issues within the sector.

Create culture: Companies must create safe remote working culture. 69% of the interviewees who explained they had acceptable technology to work remotely and there is a further 21% who felt that their technology could be improved and the remaining 10% are waiting to be reemployed into the sector and therefore could not comment, but only two companies provided Display Screen Equipment self-assessment forms. This shows that policies must change to ensure that staff are working safely by advising employees how to sit correctly, have appropriate chairs, the location and height of a 'desk' and the dangers of trailing leads especially with children in the area.

Control systems: Access control systems are an essential method of managing employees in an office/site. By using this management analysis technology, companies can review how many employees are accessing the areas and analysis can be completed to strategically plan which essential employees are required. Construction sites can use this to deter the public from the sites, only let specific members on and plan which trades need to be in specific areas of the sites.

Courageous decisions: A greater use of pre-fabrication must be used. Pre-fabrication has many benefits, as it allows products to be made in safe factory conditions whilst using robotics to construct the products which are then transported to site and installed using less operatives. However, for this study, site managers are leaving site to pick up materials when their responsibility is onsite. Pre-fabrication is a safer and more efficient method of working, enabling workers to keep a safe distance from each other and leaving site faster. Further to this, a 'materials ordering system/software' must be developed for all site materials including both pre-fabricated and ancillary supplies to ensure that the lead times are not extending, employees are not put at risk and can be delivered to site more efficiently without delay. The Government need to help Micro, Small, and Medium Enterprises' to be more courageous and invest in more efficient methods of working such as pre-fabrication programming/ordering software and technology. By offering grants and discounts to frameworks, it will give businesses more confidence to take financial risks and become more profitable upon project completion.

Combat mental health: There has noticeably been an increase of mental health issues as the UK Government and charities have publicised this, however policies must be implemented to combat mental health and wellbeing, infiltrating knowledge through employers by using E-learning and video conferencing by participating in courses, liaising with mental health first aiders and informally catching up with colleagues.

Care for employees: One of the interviewees explained that they had received a personal protective equipment (PPE) hamper to attend sites and alternative offices. PPE should be the last method of protection; however, care must be shown towards employees as they deserve adequate safeguarding. By delivering PPE hampers to employees, it will mean they have got it and it is ready to use when needed and will not have to search through offices to find it.

Implications and Limitations

This study contributes to the field of crisis management and the effects of pandemic have had on the UK construction sector and what could be considered for the process of future proofing businesses. This information will benefit companies within the construction industry such as consultants', contractors and developers, researchers, government bodies and professional bodies.

Despite the novel insights provided by this study, it has some limitations. Given that the research reported in this paper was exploratory by nature, the results presented are only tentative and not generalizable. Furthermore, the findings of this paper are limited to the UK construction sector only. Although generalizability outside of this context may be limited, we suggest that the results are relevant to comparable developed countries. There is a need to explore the impact of the COVID-19 pandemic on the construction sector worldwide to identify similarities and differences between responses in developed and developing countries. Further studies could be carried out using survey questionnaires for cover a wide geographic area and compare the similarities and difference in various countries. This research could generate benchmark data and identify effective practices in managing the COVID-19 outbreak.

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