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Defining the Key 'Professional Development Skills' of Construction Managers from Influential UK Construction Organizations

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This research presents a profile of the sought-after competencies of construction managers in leading United Kingdom (UK) construction organizations. In doing so, the work contextualizes the construction organizations influence in terms of revenue and employability; conducts a textual analysis of interpersonal and technical competencies from construction manager job advertisements to ascertain the specific competencies desired by construction organizations; and provides a ranking of said competencies to establish a competencies hierarchy in order to inform curriculum development processes.

Research findings demonstrate that interpersonal competencies have around 70% importance within the role of construction manager. There exists; however, a prevalent vernacular imprecision within the job advertisements about the specific technical competencies for the role exist. Specifically, the lack of digital-esque skills is profound. Thus, a misalignment is present between current educational provision and industry practice regarding the core foundational competencies required of the construction management profession.

This research constitutes an attempt to conduct a textual analysis of descriptive metadata contained within construction manager job advertisements from leading UK construction organizations. Emergent findings revealed specific competencies that are essential to the core of the modern construction manager's role.

Key Words: Interpersonal Skills, Textual Analysis, Leadership, Teamwork, Communication

Introduction

The United Kingdom (UK) construction sector, according to His Majesty's (HM) Government (Rhodes, 2019), comprises around 343,000 companies (13% of UK businesses), which employs approximately 2.4 million individuals (7% of UK jobs). These companies and individuals are responsible for £117 billion or 6% of the UK's economic output (Rhodes, 2019). At the heart of this national economic engine is the construction manager – responsible for the financial, safety, quality, schedule, and holistic project success (Walker, 2015). Metaphorically, a construction manager

constitutes the glue that holds not only the construction project, but also the construction team together (Harris et al., 2021; Posillico et al., 2022a). Without proper management and leadership of the complex teams responsible for these key attribute areas, a project's overall success is severely jeopardized (Nicholas & Steyn, 2021). Therefore, the skills and competencies of a construction project manager must be complementary to the role.

This present research aims to inductively observe, measure and record what interpersonal and technical skills and competencies are required by practicing construction managers. Specifically, the research question posed is: "What are the key 'professional development skills' UK construction organizations are looking for in construction project managers?" Given this question, this research seeks to conduct a textual secondary data analysis of UK construction project manager job advertisements to determine the specific 'professional development' skills and competencies that practicing construction organizations are pursuing in their managers. Job adverts were used because they constitute a snapshot of industry practitioners' employability requirements and offer an opportunity to compare these against curricular developed. Research objectives are to: identify and categorize skills and competencies of project managers into themes to differentiate those that are technical and those that are interpersonal in nature; contextualize the current state of professional skills requirements in UK construction organizations so as to act as a barometer for specific preferred skills and competencies; and help identify routes to incorporate these findings into construction management curriculum design and so ensure that contemporary higher education institutions (HEI) programs offer the optimal employability opportunities for graduate students.

Methodology

A mixed philosophical design is adopted, and inductive reasoning used to acutely analyze extant secondary data on construction management job advertisements – the purpose being to raise awareness and engender new polemic discussion and debate (cf. van der Meij et al., 2021). An iterative three tier approach to research investigation is adopted. First, a pragmatic philosophical lens is employed to identify influential UK construction organizations and obtain their respective job advertisements for the role of construction manager. Second, an interpretivist lens is employed to manually (and via software) decipher key words, shared themes, and common associations into thematic clusters from the aforementioned secondary data (Posillico et al., 2022b). Third, a similar pragmatic philosophical stance is again implemented to rank the various terminology clusters to evaluate their differentiation significance between the advertisements (Posillico et al., 2023).

Text/Data Mining Technique

Voyant Tools, an open-source software program, was utilized to analyze sample job advertisements. Voyant Tools offers a 'web-based' interface which can be used to analyze user input text which can populate the frequency of words, word associations, word context and trends as network infographics (Sinclair & Rockwell, 2016). Voyant Tools has been extensively used in a wide range of built environment publications as a robust textual analysis tool to help create a positional picture of contemporary developments for a given phenomenon under investigation (Çimen, 2021).

Results

Utilizing a host of construction industry publication company's rating and ranking indices (e.g., *The Construction Index*, *Construction News*, *Construction Global* and *Construction Review Online*), construction companies with a noteworthy impact (minimum construction revenue of £700 million,

minimum of 1,600 UK employees) were identified (frequency (*f*) = 10). The ten companies in aggregate, according to their 2020/2021 Annual Reports, are responsible for £34.3 billion in global revenue and employ over 56,000 employees in the UK. Complete job advertisements for the role of 'Construction Manager' or 'Project Manager' were located within each of the companies' career/Human Resources portal and downloaded.

The specific construction sectors were recorded for the ten companies to help display the range of services offered by the company (refer to Table 1). Whilst the number of different sectors a specific company engages within does not necessarily indicate a 'better' company; the aggregate quantity of different sectors does help to demonstrate the wide net the ten companies cast over the construction industry domain. Specifically, the ten companies are engaged with *f* = 28 different sectors within five main industry categories. The ten companies participate in an average of *f* = 11 sectors (*f* = 10.9 specifically) with an overall range of eight to *f* = 16 sectors. Furthermore, at least three or more companies share over half of the industry sectors (53.57%).

Within the spectrum of sectors noted, four appear to be dominate – where at least eight of the ten companies (80.00%) are engaged in: 'general commercial,' 'healthcare,' 'education' and 'general residential.' It should be noted that three of the four dominant sectors fall under the 'commercial' category. Of further note, the main 'civil' category sectors of 'rail' and 'roads / highways' represent seven and six companies each. These metrics are in line with governmental agendas, inclusive of financial backing, to promote and enhance the built environment in these sectors (HM Treasury, 2021).

Analysis of UK Construction Management Job Advertisements

Ten job advertisements for the role of 'Construction Manager' or 'Project Manager,' (depending on the specific vernacular of the construction organization) were identified. While there may be slight differences between the two roles, for the purpose of identifying the professional skills needed for the role, the two titles are aligned (Walker, 2015). The term 'Construction Manager' will be used hereafter. The job advertisements were located on the specific construction organization's Human Resources or Careers webpage. Whilst some very specific job advertisements were noted (e.g., Electrical Construction Manager or Civil Infrastructure Construction Manager), generic Construction Manager job advertisement was sought which would represent the widest spectrum of attributes of the role. Additionally, the construction organizations, when advertising for the Construction Manager role, utilized an open or broad job advertisement. Similar to academic postings (e.g., Lecturer, Senior Lecturer, Associate Professor), whilst the specific project or location can change, the core components of the role are firmly rooted. Thus, the ten job advertisements represent an appropriate sample size for analysis (Robinson, 2021).

The description of the 'key responsibilities / accountabilities,' 'role duties,' 'competencies,' 'personal requirements / qualities,' 'qualifications' and/or 'desirable criteria' for each of the ten job advertisements were uploaded into Voyant Tools to identify frequently occurring (*f* > 4) keywords. A summative list was assembled, and then manual cleansing was performed to remove duplicates and different grammatical forms of the same word which resulted in *f* = 101 keywords. Within the *f* = 101 keywords, *f* = 68 (67.32%) occurred six or more times with *f* = 28 (27.72%) occurring at least ten times. This suggests that there is a degree of commonality between job descriptions. Although the job descriptions were crafted by different individuals from different organizations, an interpretation of the analysis suggests that common linkages exist.

Table 1
Ten Companies Construction Sector Classifications

Category	Sector	C001	C002	C003	C004	C005	C006	C007	C008	C009	C010
Government	Defense	✓	✓	✓	✓			✓		✓	
	Emergency Services					✓					
	Judicial	✓	✓	✓				✓		✓	✓
Commercial	*General Commercial*	✓	✓	✓	✓	✓		✓	✓	✓	✓
	Retail					✓			✓	✓	✓
	Healthcare	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Heritage			✓					✓	✓	
	Hospitality			✓							
	Cultural							✓			✓
	Life Sciences / Technology									✓	✓
	Leisure / Community				✓	✓			✓	✓	✓
	Pharmaceutical			✓							
	Education	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Civil / Infrastructure	*General Civil / Infrastructure*				✓						
	Aviation	✓	✓	✓			✓		✓		
	Roads / Highways	✓	✓	✓			✓	✓	✓		
	Rail	✓	✓	✓	✓		✓	✓	✓		
	Ports / Coastal			✓			✓		✓		
	Tunnels						✓				
	Water / Wastewater	✓		✓			✓	✓			
	Utilities									✓	
	Data Centers / TeleComm			✓						✓	
	Gas / Oil	✓								✓	
Residential	*General Residential*	✓		✓	✓	✓	✓	✓	✓	✓	✓
Environment	Nuclear	✓		✓							
	Mining / Metals									✓	
	Renewable Energy	✓					✓				
	Power									✓	

In addition to measuring the keyword frequencies, identifying the frequency of job advertisements in which the keywords are used can provide a supplementary viewpoint. Of the $f = 101$ keywords, $f = 89$ (88.12%) appeared in at least three job advertisements. Of those $f = 89$ keywords, $f = 24$ (23.76%) appeared in at least six of the job advertisements. Only three (1.88%) keywords (viz. 'deliver,' 'project' and 'manage') appeared in all ten job advertisements.

Of the $f = 101$ keywords, a manual review was completed to identify words that were related and/or associated with the phrase 'professional skills development' with a view to deriving thematic clusters which could house these words. Emergent themes transpiring from this manual review were two dichotomous groups of 'technical' and 'interpersonal' skills and competencies – these were then applied when manually reviewing the keyword list; excluding any 'neutral' words, which resulted in a final list of $f = 17$ themed keywords. The keywords were ranked twice: once according to work frequency and once according to advertisement frequency. Average rankings were calculated for each keyword to determine the keyword magnitude, as noted in Table 2.

Table 2

Themed Keyword Ranking

Keyword (Root)	Theme	Keyword Frequency (*f*)	Rank (No.)	Advertisement Frequency (*f*)	Rank (No.)	Mean Rank (No.)
Manage	Interpersonal	58	1	10	1	1
Team	Interpersonal	26	3	8	2	2.5
Ensure	Interpersonal	27	2	7	4	3
Lead	Interpersonal	16	6	7	4	5
Understand	Interpersonal	21	4.5	6	7	5.75
Communicate	Interpersonal	11	8	7	4	6
Build	Technical	8	9	6	7	8
Plan	Interpersonal	21	4.5	4	12.5	8.5
Engineering	Technical	7	10.5	6	7	8.75
Appropriate	Interpersonal	12	7	4	12.5	9.75
Relationship	Interpersonal	6	13	5	9	11
Cost	Technical	7	10.5	4	12.5	11.5
Budget	Technical	6	13	4	12.5	12.75
Decision	Interpersonal	5	15.5	4	12.5	14
Discipline	Interpersonal	5	15.5	4	12.5	14
Technical	Technical	6	13	3	16.5	14.75
Contribute	Interpersonal	4	17	3	16.5	16.75

From Table 2, it is apparent that not only are there more 'interpersonal' themed words than 'technical' themed words (70.59% to 29.41%), but the overall impact of 'interpersonal' keywords is much greater than 'technical' keywords. The top six keywords are 'interpersonal' themed and account for 64.63% of the total word frequency and 48.91% of the job advertisement frequencies of the $f = 17$ themed keywords. Of the five technical keywords noted (refer to Table 2), only two would be considered granular in description: 'cost' and 'budget'. The remaining three ('build,' 'engineering' and 'technical') are surprisingly vague in description. With a momentous focus and push for digital and technology skills in construction academic literature (cf. Li et al., 2022; Zhang et al., 2022), it is perplexing that ten of the UK's most impactful construction companies did not mention: 'Building Information Modeling (BIM),' 'virtual reality,' 'augmented reality' or 'digital.' In fact, of the over 550 keywords, the only digital-esque phrase was 'Microsoft Excel' which was used just twice.

Another interesting observation noted when analyzing the keywords of the job advertisements was the mention of each main construction industry participant. Specifically, the keywords 'client', 'company', 'stakeholder', 'business', 'contractor' and 'customer' were used an average of eight times (minimum = 6 and maximum = 14) in an average of four job advertisements (minimum = 3 and

maximum = 6). From this analysis, there appears to be a stout awareness that the construction manager's role is intrinsically linked with the owner(s) of a construction project. The prominence of this interrelationship between construction manager and owner directly impacts the types of preferred skills and competencies essential for the role.

Discussion

There are three main practical applications of the results. First, interpersonal skills have a high level of importance to the construction manager's role. Interpersonal skills such as leadership, communication, teamwork and understanding are frequently referenced throughout a large majority of construction organizations (refer to Table 2). Second, there is a vagueness regarding the technical skills required and/or sought after for a construction manager role, such as 'build,' 'engineering' and 'technical.' Moreover, the deafening silence of the job advertisements regarding general or specific digital skills is in direct opposition to that of current academic digital pursuits (Schiavi et al., 2022). Finally, and along a similar vein, current education provision and industry practice are misaligned about the core foundational skills needed for the construction management profession. Construction management curricula is currently pursuing elevating digital 'everything' within the curriculum whilst current, practicing industry professionals are explicitly noting the opposite – a strong focus on interpersonal skills.

The importance of a complementary set of interpersonal and technical skills with the construction manager role has been generally accepted in both wider (non-construction) academia and industry (Posillico et al., 2023; Wasson, 2020). However, it is confounding that, when viewing specific skill vernacular of job advertisements, an interpersonal skill set profoundly takes center stage. Perhaps this shift in view is based on the management-esque aspects of the role rather than the niche construction/technical skills – a construction manager is responsible for managing the project, not physically designing, or building it (Benator & Thumann, 2020). Additionally, the absence of digital skills, under the larger umbrella of technical skills, further illustrates the industry's overriding preference on interpersonal skills for managing projects. The expertise of digital skills appears to be outside the remit of (or at best in the fringes of) a construction manager and lies within a new subsidiary position specifically fixated on and limited to digital, (BIM Manager, Virtual Design Construction Manager) aiding the management team's wholistic running of a project (Baldwin, 2019). Instead, it appears that the construction manager needs an appreciation of digital skills only so that they may interact with others within the team (for example designers) but do not need to be adept in implementation of technology per se. Often, technology applications is another team member's job and so familiarization is needed only. Endorsement of these assumptions is needed to investigate: 1) the connection between academia and industry practice to determine if and to what extent, gaps exist as this would directly impact taught educational provision; 2) perceptions of academics on industry stated preferred skills to observe if there is consensus or discord between educators'' perceptions and that of industry; 3) to determine to what degree are practicing industry professionals are embedded in the development of curricula. A harmonious relationship between academia and industry is vital to ensure that educational curriculum is not only academically sound, but also current with industry practices and the skills and competencies required for those practices.

With all research conducted, there are inherent limitations. With this specific secondary data research, one of the main limitations is the researcher bias that is closely linked to an interpretivist philosophy. To that end, the use of a quantitative-esque approach (Voyant Tools) was implemented to counterbalance this philosophical limitation (Posillico et al., 2021). Additionally, the secondary data being analyzed may be inherently flawed, incomplete and/or imprecise. Specifically, regarding the content of a job advertisement, the research must take the published content at face value given the

seriousness and outward publicity of the document. Finally, the research analysis was conducted purely on the information provided in the job advertisements. Potentially speaking with the construction organizations' Human Resources Departments about the information within the job advertisement and/or provide additional pertinent information could further increase the validity of the secondary data and its analysis.

Whilst the textual analysis findings of specific keywords associated with 'professional skills development' yielded many results, it was the frequency and themes of the keywords which uncovered the explicit skills current construction organizations are seeking in construction managers. Future primary data research will help to bring forth the current industry findings into an academic and curriculum development setting to establish a steadfast connection between industry and academia. Built environment academics will serve as a practical and well-placed sample for obtaining this primary data.

Conclusion

The construction industry plays a principal role within the UK economy. At the core of this industry lies the construction manager – responsible for delivering an infrastructure project within its stated objectives. To determine the key skills/competencies of this role, 'professional skills development' keywords within publicly available construction manager job advertisements from ten influential UK construction organizations were obtained. The keywords were qualitatively and quantitively examined through manual and electronic means. The overwhelming presence of interpersonal skills, the vagueness of technical skills and the absence of digital themes were the main keynotes. This research uncovered that different construction organizations who are engaged in different categories/sectors of work throughout similar and different parts of the UK share a steadfast commonality in the preferred skill set of construction managers – interpersonal skills. Furthermore, the ambiguity regarding specific technical skills and an absence of digital skills reference, further reinforce the construction organizations' weight behind the importance of interpersonal skills for the construction manager.

It is strikingly clear that influential construction organizations in the UK are seeking strong interpersonal skills for construction managers – and in many ways this makes perfect sense. The role is after all to manage people not technology per se, and/or people using technology and so an appreciation of advanced technology is required only. A luddite view is not being proposed here – advanced technology has progressed and become infused in the skills and competencies of construction managers – the mobile phone, laptop, project management software and internet access being but several examples that have transformed the role over previous decades. But the role of a manager (indeed, any manager not just a construction manager) is to manage first and foremost – for example, they need to interpret a BIM model, not develop it. This is a fine but important distinction and perhaps presents a moment for pause and reflection of curriculum content development – are HEIs heading in the right direction and are HEIs providing employable graduates? The publicly available job advertisements, in which perspective applicants (practicing professionals), future applicants (students) and associated partners (academia) paint, in vivid colors, a very humanistic, people-oriented landscape. From this, construction management programs should, at the very least, perk up and take notice – for this is the role which the program is preparing students for.

Fruitful construction projects bolstering a productive industry is an objective of any nation's economy in which construction plays an influential role. The adequate education and preparation of students entering the construction management profession is generally understood by academia and industry alike. However, there is a divergence between the two entities as to exactly what skills/competencies support adequate instruction. Through unearthing the specific 'professional skills development'

skills/competencies of construction managers it is hoped that these can actively inform construction management curriculum development. This is essentially needed, not only for the relevancy of a program but for the future of the profession.

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