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RESEARCH ARTICLE

Exploring project managers' perception of stress when working in increasingly complex construction projects

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Abstract

Stress is a recognised feature of the project managers' life. Projects are becoming more complex with the uncertainty in the system contributing to the lack of control and added stress. This study explores a microcosm of 25 project managers in the South Australian construction industry, their perceived level of uncertainty and stress. The project managers interviewed provide their views on what their key stressors were and the mechanisms they use to manage effectively their stress. The results showed that structural, technical and directional complexity of projects was high, but this did not always convert into more stress for the project managers. The results indicate that stressors like the lack of resources; lack of control and increasing accountability were project managers' primary concerns. Coping strategies included optimism, applying emotional intelligence and active planning strategies. In addition, they reduced their stress by working with good teams, using theirs and their team's experience, implementing sound systems and processes and effectively researching and gathering information.

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Keywords

stress; project management; project complexity, coping strategies

Introduction

Many project managers find project work motivating, stimulating and creative, but it also has a frustrating, ambiguous and stressful aspect to it (Karrbom, 2016; Koolhaas et al., 2011; Hosseini, Chileshe and Zillante, 2014). The term 'stress' is ambiguous, with different people interpreting it in their own way. Stress was defined in the 1950's by Selke as "*the non-specific (i.e. common) results of any demand upon the body, be the effect mental or somatic*" (Selke, 2013). A more useful and straightforward definition that will be used by the authors of this study is: *'Stress is a state of mental or emotional strain or tension resulting from adverse or demanding circumstances.* (Blanchflower, 2014).

Leung, Chan and Dongyu's (2011) study suggested that the work of project managers in the construction industry was stressful due to the time pressures, uncertainty and the dynamic social networks involved. The project management role continues to increase in its complexity (Williams, 1999) with the success of a project being tied to the success of their project management skills (Mir and Pinnington, 2014). A dynamic work environment, with its additional pressures, imposes on the employee fluctuating workloads, undefined requirements, and multiple role demands (Turner, Huemann and Keegan, 2008; Sunding and Ekholm, 2014). A major part of a project manager's role is to manage the uncertainty and risk of a project, and this also leads to stress.

Previous studies have made valuable contributions to stress management and how project managers manage stress. In this study, we initially identified through the literature review what complexity means for project managers and what attributes to the level of complexity. Literature is examined to understand and interpret the stress imposed by this increased complexity of projects and what other authors' research tells us about the cause and mechanisms used to manage that stress. The next section of the study outlines the grounded research methodology and the process for selecting participants. The subsequent section applies the comments made to specific questions to explore how project managers in the construction industry of South Australia cope with stress, what they see as causing it and how they manage it. The final section covers the conclusions made from the analysis of conversations and identifies the potential gaps and deficiencies attached to this research.

Projects, complexity and stress

COMPLEXITY IN PROJECTS

Complexity in projects has become a topical issue in recent years. Increasing complexity has been attributed to the growth in the size of projects, the rising competitive and dynamic environment, plus the challenging characteristics of programs and projects themselves (Qazi et al., 2016; Antunes and Gonzalez, 2015). The management of complexity in projects includes setting up the appropriate organisational structures, complicated contracting, and procurement processes, increased legislative controls, changing technology, multicultural workforce, and project environments, the need to cultivate talent, provide leadership, and generate flexible and resilient workforces (Bakhshi, Ireland and Gorod, 2016). Much of the interest has also arisen by so many complex projects failing due to cost overruns or time delays (Remington and Pollack, 2007; Luo et al., 2017).

There is no consensus among researchers about the precise definition of complexity. However, a characterization of what is complex is possible as it arises from the number and the nature of interactions among variables or components involved, creating multiple, dependent feedback loops that give rise to emergent and unpredictable outcomes (Antunes and Gonzalez, 2015).

While a complicated project may still be predictable (i.e. it is possible to forecast what could go wrong and treat it through the application of risk management techniques), a complex project has issues arising from the complexity that cannot be foreseen, either in their nature or severity. Earls and Ebrary (2007, p.108) explain it well when they say *"mass behaviour is inherently complex because it is based on the interaction of individual agents. But we try to understand it as if it was complicated… This is why we find it difficult to understand."* The distinction between what is a complicated project and what is a complex one has been studied extensively.

A complex project is a project having an unclear goal or uncertainty in its method of delivery. This complexity makes it impossible to plan the project from start to finish and the higher the complexity, the less likely you are to manage the project traditionally. Luo et al. (2016) looked at the relationship between project complexity and success in complex construction projects and concluded that project complexity had significant adverse effect on project success. The discussions around complexity are an extension of the concepts of 'systems theory', and it is also a reaction to the PMBOK Guide's view that people are entirely hierarchical and process driven. In systems thinking, project managers are urged to think of organisations as living systems that are defined by a complex set of internal and external relationships and connections. The system has inputs, transformation processes, outputs or products and feedback. The focus is on the organisation as a whole and the interrelationships of structure and behaviour within the organisation. This 'systems theory' introduces the concept of 'open' and 'closed' management systems. The survival of an organisation is dependent on active exchanges between the individuals and their organisation and the organisation and its environment. The system complexity is dependent on its openness, purposefulness, multidimensionality, emergent properties, and any counterintuitive behaviour (Garajedaghi, 2011).

Project complexity is difficult to quantify precisely. According to the Project Management Institute (PMI, 2013, p.11) causes of program and project complexity can be arranged into three categories: human behaviour, system behaviour and ambiguity. The PMBOK Guide attempts to address this by trying to standardise every process to make all processes as linear as possible while recognising that certain processes are happening at various times during the life cycle of the project (Curlee and Gordon, 2011). There is evidence to suggest that a paradigm shift is needed for managing complex projects, as distinct to managing the traditional linear project management processes. Bakhshi, Ireland and Gorod (2016) listed 14 definitions as to what is complexity in projects in their literature review of Google Scholar articles to 2015. Their conclusion was to define a complex project as: "an intricate arrangement of the varied interrelated parts in which the elements can change and evolve constantly with an effect on the project objectives" (Bakhshi, Ireland and Gorod, 2016, p.1203). Luo et al. (2016) looked at complexity measurement of construction projects, based on information, task, technological, organisational, environmental, and goal complexity. Other studies used different perspectives of what makes a project complex. Bakhshi, Ireland and Gorod (2016) categorised them into three groups: the PMI view, the System of System view, and the view developed from the research papers analysed.

This study chose the categorisation of complexity which was more appropriate to projects used by Remington and Pollack (2007, p.7), which categorised it into four types:

> '**Structural complexity:** *arising from complicatedness of the project's structure (esp. large projects) -difficulties in managing and keeping track of all project tasks and activities (interdependencies).*
>
> **Technical complexity:** *arising from the novelty of the technology used in the project (esp. RandD, IT, engineering projects).*
>
> **Directional complexity:** *arising from uncertainty and lack of agreement about project goals, and stakeholder disagreements: unshared goals, unclear meanings and hidden agendas (ambiguities).*
>
> **Temporal complexity:** *arising from uncertainty in the project's context, and changes in the context over time: shifting environmental and strategic directions (external influences).'*

PROJECT STRESSORS

Being a Project Manager is one of the most stressful jobs as the PM is directly responsible and accountable for the success or failure of a project (Mir and Pinnington, 2014). Stress is considered a major risk factor for a wide range of health implications and the chronic character of stressors is considered an important factor in the development of various forms of stress-related pathology. Studies confirm that construction project managers suffer from stress, the overall level of stress is considerable, with evidence of 'burnout' at the extreme (Leung, Chan and Dongyu, 2011; Senaratne and Rasagopalasingam, 2017). In 1980 Albrecht listed the primary stressors within a project, these being: time constraints; concern about the future (he called these anticipatory); the situational; and people (he called these encountered). In the same line of thought, Okuntade (2015) made these factors more explicit as: Unrealistic timelines; Working in a matrix system which PMs do not have full control of the resources; Lack of resources-human and/ or equipment; Proliferation of virtual teams and cross-cultural influences; Inter-group conflict in organization and Project environment.

The outcomes of construction projects are increasingly being made accountable to stakeholders, and because these stakeholders can often see the progress of the construction, this adds another perspective to the stress of the project manager. Ng (2005) identified thirty-three stressors for employees covering various aspects such as the organisation policies, working relationships, communication, and personal factors. In their conclusion, they found that the biggest stressors were: bureaucracy, lack of opportunity to learn new skills, work-family conflicts and different view from superiors. While incidents such as valuable resources vanishing, other organisational tasks taking more time and energy than planned, promised resources are not assigned, duties and goals have to be reassigned, etc. these influenced the individuals' perception of project working conditions (Gallstedt, 2003). The project access to 'resources' appears to be the biggest cause of stress, and trusted teams appear to be the best defence (Gallstedt, 2003). It needs to be stated though that Gallstedt's study was not specific to project managers and included clients, consultants, team members and contractors.

There is also evidence that experience, genetic makeup, and cognitive perception of situations varies the impact of the stressors (Koolhaas et al., 2011). Personal ambition and social expectations also influence on project managers stress levels. Bowen et al. (2014) gathered data from an on-line questionnaire sample of 676 architects, civil engineers, quantity surveyors, and project and construction managers. The results showed that there was a significant relationship between occupational stress related to work–life imbalance, the need to 'prove' oneself, long hours worked, the working to tight deadlines, and support from line managers in demanding situations at work. Project management role, especially in multi-project settings, is challenging, characterised by tight schedules, multitasking, multifaceted negotiation and coordination for resources, and the need to take responsibility. Zika-Viktorsson, Sundstrom and Engwall (2006) study investigated the psychosocial aspects of work in multi-project settings and how project managers from a range of industries including construction, viewed their work situation. This author found that one-third of the 392 respondents were under 'project overload', which was defined as a low adherence to time schedules, little development of skills, less activity for improvement and high levels of psychological stress reactions. Stress was caused predominantly by four factors, namely, the lack of opportunities for recuperation, inadequate routines, scarce 'time resources', and a large number of simultaneous projects. A summary of project stressors is provided in Table 1.

Table 1 Stressors identified in Research

Stressors	Author
Time constraints; concern about the future; the situational; and people.	Albrecht (1980)
Valuable resources vanishing; Other organisational tasks taking more time and energy than planned; Promised resources are not assigned; Tasks and goals are reassigned.	Gallstedt, (2003)
Inadequacy/inconsistency of communication flow; Paperwork – too much, too much unnecessary, high volume of reading material; Workload – constant time pressure; Lack of competent staff to do the job properly; Inadequate numbers of staff to do the job properly; Unable to delegate because of staffing problems. Conflict of boundary situations; Working long hours; Insufficient time spent in family/home environment; The company strategy – competitive/ dynamic/go-getting image, changing staffing problems.	Haynes and Love (2003) Table A P132
Bureaucracy, Lack of opportunity to learn new skills, Work-family conflicts, Different view from superiors	Ng (2005)

Table 1 (*Continued*)

Stressors	Author
Lack of opportunities for recuperation; inadequate routines; scarce time resources; and a large number of simultaneous projects.	Zika-Viktorsson, Sundstrom and Engwall, (2006)
Work–life imbalance; the need to 'prove' oneself; long hours worked; the working to tight deadlines; lack of support from line managers in difficult situations at work. Tight schedules; multi-tasking; multifaceted negotiation and coordination for resources; the need to take responsibility	Bowen et al. (2014)
Unrealistic timelines; Working in a matrix system in which PMs do not have full control of the resources; Lack of resources-human and/ or equipment; Proliferation of virtual teams and cross-cultural influences; Inter-group conflict in organisation and Project environment.	Okuntade (2015)

COPING WITH STRESS

Construction project managers with different personalities make diverse assessments of risks and develop therefore a variety of different risk management strategies (Wang et al., 2016). There appears to be a negative correlation between the amount of control a person has over their job and the level of stress they perceive. That is, low control leads to high stress (Bowen et al., 2014). The findings from studies on the person's appraisal of how much control they have shown a tendency for project managers to appraise stressful situations as controllable or requiring more information (Aitken and Crawford, 2007; Gallstedt, 2003). Aitken and Crawford's (2007) study supported the view that project managers use more active and planning coping strategies when dealing with stressful situations. The findings of this study also demonstrated that project managers appraised stressful situations as controllable or requiring more information.

Historically, leadership theories focused on the individual leader and his or her traits with subsequently leadership theory moving to account for the context of the leadership situation to consider personal attributes to the intellectual exchange and interpersonal relationships. Dolfi (2007) recognised that the intrinsic characteristic needed by project managers was one that enabled them to cope with uncertainty.

Researchers have explored the concept of emotional intelligence and the need for project managers to be technically and socially competent (Kloppenborg and Opfer, 2002; Keegan and Den Hertog, 2004; Thomas and Thomas, 2008). Project manager competency profiles vary with the type of project conducted but rely on an ability to think critically, to influence and to motivate people plus the trait of conscientiousness (Muller, 2007). Project managers perform better and stay longer in their role if their personal characteristics meet the requirements of the position (Mumford et al., 2000).

There is debate as to whether project managers self-select so that those that continue in this role have the personality type or temperament to manage the stress of project management.

Studies such as Haynes and Love (2003) and Aitken and Crawford (2007) support the concept that project managers use more active and planning coping strategies when dealing with stressful situations and that the use of planning strategies is related to the level of project management practice that they are exposed to (represented by organisational project management maturity).

Other studies have looked at the leadership style of the project manager. Muller (2010) concluded that a more transactional style was appropriate for relatively simple projects and more transformational leadership styles in complex projects. Transformational leaders operate effectively in rapidly changing environments by working with their teams to generate creative solutions to complex problems, while also encouraging them to take on a broader range of leadership responsibilities. Transactional leaders work within the system and are motivates by the need to meet organisational goals. They use reward and punishments to gain compliance from their followers tend to be directive and action-oriented (Bass et al., 2003).

Optimism plays an important part in a project manager's ability to cope with their environment (Dolfi, 2007) while the strength of the emotional competencies of self-awareness, emotional resilience, motivation, sensitivity, influence, intuitiveness, and conscientiousness, were the most important for assuring successful projects (Rezvani et al., 2016; Muller, 2007).

High emotional intelligence is considered to be a positive attribute for project managers (Rezvani et al., 2016; Muller, 2007; Livesey, 2015) leading to project success, better job satisfaction and trust in others. Emotional intelligence (EI) is the capability of individuals to recognize their own, and other people's emotions, to discern between different feelings and label them appropriately, to use emotional information to guide thinking and behaviour, and to manage and/or adjust emotions to adapt environments or achieve one's goal(s) (Colman, 2009). Training in emotional intelligence is considered as a worthwhile exercise for project managers with positive results on project success (Clarke, 2010). Emotional intelligence also has a positive relationship with job satisfaction and job performance (Turner, 2007).

Specific work-related characteristics such as work experience, project size, age and level of education influenced the psychological adjustment of the project managers sampled according to Haynes and Love (2003) to enable them to better cope with their stress.

Research Method

Exploring the stress within the construction industry is difficult due to its all-encompassing and multifaceted nature. Miles, Huberman and Saldana, (2014, p.11) suggest that qualitative methods have one feature in common in that *'they focus on naturally occurring, ordinary events in natural settings, so that we have a handle on what "real life" is like.'* The qualitative data is also collected with a '*groundness*', in that it discusses specific experiences directly with the project managers in a context which allows them to understand, interpret and then express their opinions. Analysis of these conversations enables the development of themes that reflect the richness and truths far more than the snapshots that could be gained from a survey, questionnaire or quiz. Qualitative research methods with their emphasis on experiences are appropriate for locating the meanings around the events, concepts and the social context of the unique environment that a project managers experience (Bryman and Bell, 2007). Research questions were general and required the respondents to explain and

describe their own experiences. The semi-structures interviews were considered particularly appropriate for this enquiry as they would draw on the knowledge and experience of participants.

The literature reviewed in the previous section provides a benchmark for what has been identified around project complexity, stress causes and coping mechanisms of project managers within the construction industry. This review of the literature has assisted in planning the narrative for the actual research what questions to ask and how open to make the conservation (Miles, Huberman and Saldana, 2014). To provide a measure of complexity, the type of projects the managers were involved in, their size and experience, the interviewees were asked precise questions, at the commencement of the interview. Once this quantitative data was collected the interview then turned to a general discussion based on open questions provided by the interviewer. All participants volunteered their time despite heavy workloads and provided a frank and open discussion.

Qualitative research is purposive rather than random, and a relatively small number of interviews can be acceptable for qualitative research with the conversations being in depth and within a precise context (Miles, Huberman and Saldana, 2014; Quinlan, 2011). The boundaries of the research were set by the desire to study project managers within the construction industry. The title of project managers in some cases is a misnomer as the debate on whether project management is a profession is still open (Konstantinou, 2015; Zwerman, 2004). Project managers in the construction industry often come into the area from a background of construction management, engineering or other disciplines. The attributes of these project managers were therefore determined before the research process commenced.

Twenty-five project managers were interviewed as shown in Table 2. All had at least five years or more experience in managing construction projects, with the average being just under 16 and a half years. The group was selected solely from South Australia but provides a valid example of what is happening in the construction industry generally in Australia. The reason why this is claimed is because it is regular for construction practitioners (including some of

Table 2 Project Management Experience in years in the construction industry

Participants ID	Length of Experience	Designation	Size (M$ - AUD)
P1	25	Construction Manager/Project Manager	>100
P2	9	Project Manager	10 - 100
P3	5	Construction Manager/Project Manager	<1
P4	40	Project Manager	>100
P5	6	Senior Project Engineer	>100
P6	20	Principle Project Manager	1 - 10
P7	7	Program Manager	>100
P8	10	Senior Project Manager	>100

Table 2 (*Continued*)

Participants ID	Length of Experience	Designation	Size (M$ - AUD)
P9	35	Project Manager	>100
P10	12	Project Manager	10 - 100
P11	12	Project Manager	10 - 100
P12	10	Project Manager	1 - 10
P13	4	Project Engineer	10 - 100
P14	5	Senior project Manager and Engineer	1 - 10
P15	10	Project Manager	>100
P16	14	Construction Manager/Project Manager	10 - 100
P17	20	Project Manager	10 - 100
P18	20	Senior Program Advisor	1 - 10
P19	9	Program Director	>100
P20	22	Senior Project Manager	1 - 10
P21	17	Senior Project Manager	10 - 100
P22	33	Managing Director of Project Management Company	1 - 10
P23	7	Project Manager	1 - 10
P24	30	Project Manager	1 - 10
P25	32	Director of Project Management Services Organisation	10 - 100

the respondents of this research) to move and work around Australia and thus have extensive experience interstate. Moreover, as it can be deduced from Chancellor, Abbott and Carson (2015) the construction Industry shows consistency nationally thus South Australia (as any other State) may provide a good example of what is relevant to Australia.

This grounded theory approach was aimed to get participants to talk generally about their role in managing the complexity, risk and stress of their work. The conversations were recorded, transcribed and imported into Nvivo 11 qualitative analysis tool given identifying and analysing common themes. The respondents came mainly from non-residential building, heavy and civil engineering construction and general construction services, working in a mix of private and Government organisations, Figure 1 provides this information visually. All except one Project Manager worked with projects greater than $1million with eight managing projects greater than $100 million (Australian $). No significant differences were revealed in the qualitative analysis between the groups (experience or project size) as can be seen from the extracted quotes provided in 'research findings' section.

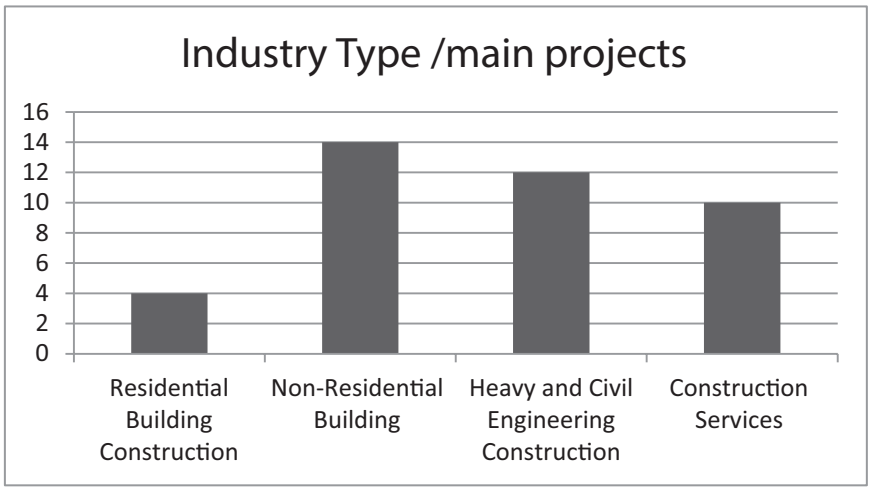

Figure 1 Industry Sectors of Construction Project Managers

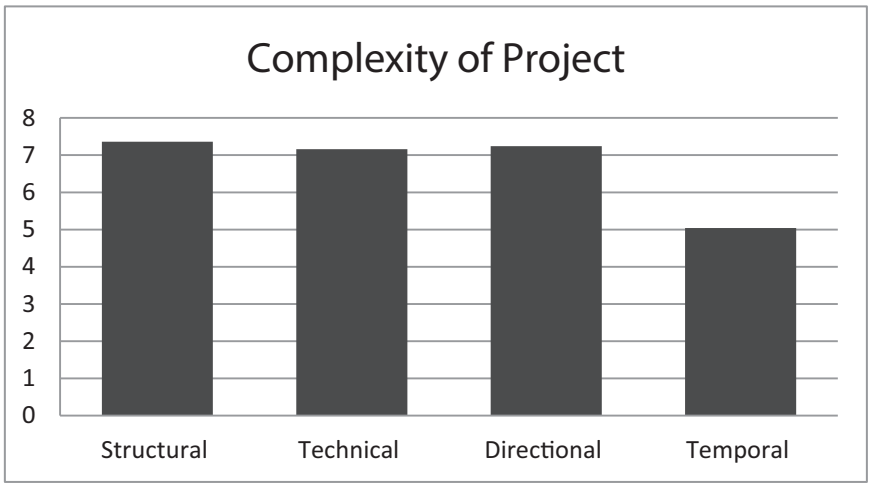

Figure 2 Ranking of complexity by Project Managers

Research findings and discussion

Each interviewee was asked to scale their level of complexity in projects according to Remington and Pollack (2007) four types of complexity, from level 1 (low) to 10 (very high), to provide some structured understanding of the complexity of their projects. Figure 2 shows their responses, with structural, technical and directional complexity indicating high results (7.35, 7.16 and 7.24). Conversely, temporal complexity was only 5.04, implying that the time pressures are not as relevant to the managers.

The word cloud below formed by the respondents' comments provides helpful insight into the words they used to describe the stress related to their role.

The perception among interviewees is that the complexity attached to projects is increasing and that this adds stress to the role, examples of comments expressing this are shown in Table 3.

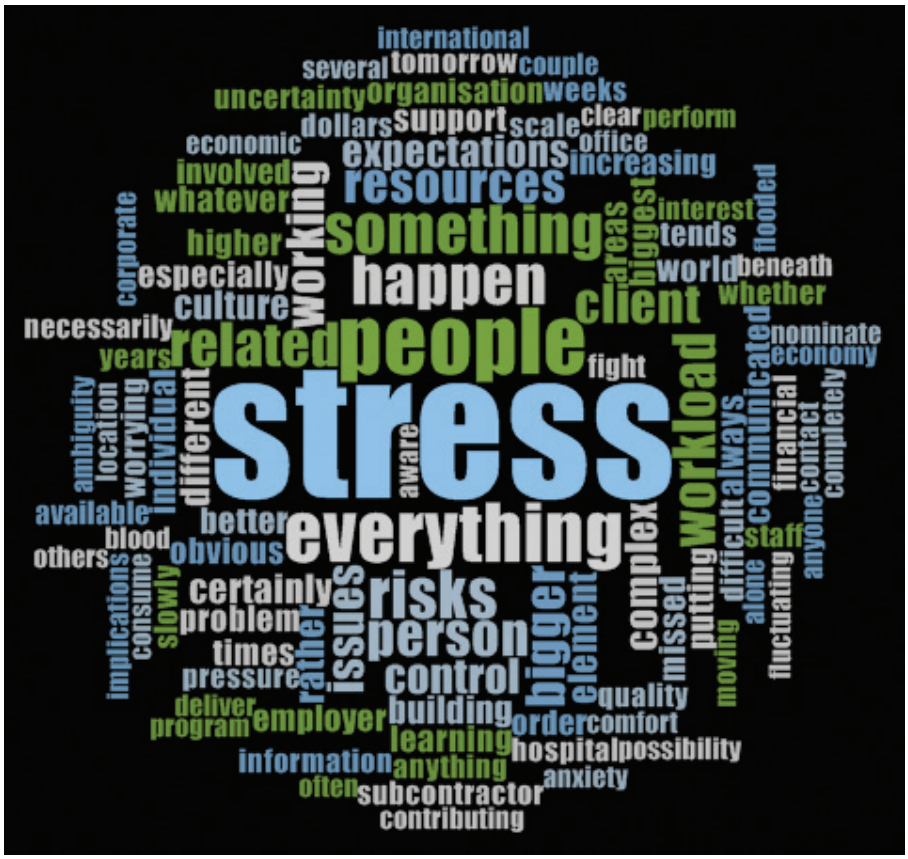

Figure 3 Word Cloud for Stress Theme

Table 3 Project managers interviewed comments on stress levels and complexity in their projects.

Stress increasing	*'pressure to perform on tight deadlines and the implications if you don't is very, very high. And that ... The bigger the project, the more risks that are associated and the bigger the risks. So, if something gets missed then implications are millions of dollars, or someone gets seriously hurt'.* (P5) *'Well it comes down to the role, it can be a stressful role. I guess some take it more on board than others in terms of their approach to it. .....But it is stressful, you're carrying the can, and I guess on bigger projects particularly, risk becomes more at the fore, and to have that well covered. And accountability you've got to be in a position always to have had something ready, you have had to consider everything. I guess that's where the risk schedule comes into it, and management of that. "We've considered this. We've got this contingency in place, or whatever". But it can be, it certainly can be stressful'* (P18) *'So, I think yeah it's highly stressful. We're playing with other people's money, other people's time, we're managing other people's expectations, and if we get it wrong then, you know, there's a world of hurt that could come down on us'.* (P17)

Table 3 (*Continued*)

Complexity levels increasing	*'like in this project there's joint ventures, so you've got XXX, XXX are doing a joint venture to do the construction, and there's three other companies doing the design joint venture so you're dealing with a lot of different people from different backgrounds and you've got to try and understand ... There is a definite structure to how it all operates but sometimes yeah it can become like as to who's looking after what and things like that.'* (Structural complexity: P5) *'....the reason for that is legacy drawings that we're often very constrained with which is a huge risk for us because the drawings were developed in the 60's and 70's. Unfortunately, they've not been maintained so it's very much speculative when I'm doing underground work, we have to do ground penetration rate before we dig a hole because we'll hit things that we don't want to hit. So, from a structural complexity, I'd say about an eight of ten'* (Structural complexity: P6) *'Hidden agendas and ambiguity, so that's actually linked to the structural side of things at the top definitely.'* (Directional complexity: P10) *'But on a job this size, it's quite complex. Like, we've just had to fly in a team from Spain to try and sort some problems out. So, technical complexity on that side of things is probably a nine.'* (Technical complexity: P11) *'There's been a lot of innovation that we've had to do and a lot of melding old technology with new and to get it to work, with incomplete design and documentation.'* (Technical complexity: P8) *'...we do have changing environment from time to time ..., if there's an emerging issue and especially if it's actually an environmental issue it can be quite constraining.'* (Temporal Complexity: P6) *'I think that's an evolving thing because it's like scope, you know the full scope before you start. Well in a real world, yes you think you do. In reality, no you don't.'* (P6) *'...we tend to move these days more into more complex projects, and by complex I mean more things in the project that have to be managed, and also that international projects and worrying about, or not worrying, but having to take into account ethnic and religious and all those sociological and all those sorts of parameters with people.'* (P9)

Project managers clearly identified what they considered as their main stressors (see Table 4). These included working in complex systems in which PMs do not have full control of the resources; Lack of resources-human and/ or equipment; lack of control, and increasing accountability.

Participants worked hard to develop personal techniques that enabled them to moderate better the increasing complexity and stress of their projects they appraise projects as

Table 4 Stressors in the project manager's role

Lack of resources- (human and/ or equipment)	*''I think people are doing more with less and that ultimately is leading to an increased level of stress.'* (P3), *or my biggest source of stress on projects, I think it probably just comes down to my resourcing across different projects and whether I really have the time to do things, kind of properly.* (P14) *'...because resource constraints actually, there is a lot of them ....* (P20)
Lack of control	*'Corporate policy, bureaucratises, politics cause stress.'* (P8) *'The biggest thing that causes me stress is things that happen outside of my control. So, like something will happen, we'll go, everything's going smoothly, something hits you out of left field...'* (P11) And *'I've got a high tolerance for ambiguity, right, but then a high-pressure stake, when the stakes are high, that doesn't sit well. So where normally I'm comfortable with the don't know stuff, I can deal with stuff, it's the magnitude of uncertainty or ambiguity that sort of like really bothers me. And the more I know, the more comfort I get, the more, you know, more relaxed I become. The less stressed, I should say.'* (P19) *I guess it's the things that cause me most stress are things beyond my control. That last minute changes, last minute demands from our client.....*(P21)
Increasing accountability	*'It's definitely increasing, I think you'd have to say, given there's more justification around project expenditure, what we're doing in the community, it's a much higher profile. Certainly the areas I was involved in, so .... if something goes wrong you'll be the point of contact, and at that point, it can be very difficult.'* (P18) *Everyone's after a certain result. I mean life these days can tend to be stressful and because there is this expectation that everyone will perform to a certain level and/or above, then if you take that on or if you don't perform, it depends; every individual is different and how they, if they take that on board then you let it, can get to you and become very stressful.* (P24)

controllable, have an optimistic attitude and undertake actively planning. The project managers, when discussing management of stress, focused on such things as experience, trustworthy teams, reliable systems and competent colleagues.

Their **experience** gave them a perspective that enabled them to manage the complexity of the projects and adapt to the changing situation. The level of experience in project management work did seem to be a decisive factor in how well project members react to a situation or incident (Aitken and Crawford, 2007).

Trustworthy teams who they could use for support and information. Project managers saw stress in their teams and subcontractors, and they perceive much of their job is about managing people. The attitude of their organisation and the support of their team help them handle the stress.

Dependent on reliable systems and processes that they had developed or which were instituted in their organisations that worked to support their management of uncertainty and reduced their stress. Some relied on those systems and processes implemented in their organisation, but others enhanced these with their own processes that enable them to feel comfortable that they had enough information to give them confidence.

They are good at seeking the **experts and sourcing information** whether from associated parts of their organisation, Google or paid experts.

These themes are demonstrated by some of the many comments in **Table 5**.

Table 5 Project managers' ability to manage stress

Tendency for project managers to appraise stressful situations as controllable	*'The more experienced you are, ... the anxiety will slowly just go away, and then as you face a new challenge the anxiety will come back again.'* (P10)
	...stress generated by risk, of you're able to capture and understand that risk earlier in the piece, then it all becomes quite easy. (P22)
Optimism also plays an important part in a project manager's ability to cope with their environment	*'It's a well-known fact we can manage what we know. We can't manage what we don't know.'* (P1)
	'I think if one thing goes wrong, that's probably it. In projects that are, you know, I'm talking quarter of a million, not several million dollar projects, so they're not really big enough for things to snowball and go catastrophically wrong.' (P3)
	'Essentially, we just take stock of the situation, sit down, have a look, see what we can do and just work with what you've got essentially' (P6)
	I've got subcontractors that have said to me; they just want to see me just lose it one day, just, they've never seen me get stressed. I guess it's a personal trait. Like I said, the problem's still going to be there tomorrow. There's no; I don't see any point losing sleep over something...' And *'that's probably my personality side of things. But with that, I think, if you remain calm with a clear head, you can sit back, look at the bigger picture and start moving the pawns in the project to get things done.'* (P11)
	'Yeah to a certain extent yes just like you're going to have the pessimistic people out there in a workshop that will think everything leads to death, which it might do, but there's a point where you can just over analyse unknown unknowns and what's the likelihood that that's ever actually going to happen? So, let's not get caught up on the one in a zillion unlikely event, let's focus our attention to the likely unknown unknowns. So, I think yeah there can be you know paralysis as well in that.' (P8)
	'That you haven't seen before and you have to be adaptive to try and work with.' (P15)

Table 5 (*Continued*)

Active planning as a coping strategy	*'I put a lot of effort into the PMP* [project management plan] *normally, because it's where you start your thinking cap on and plan, as best as you can, the process and methodology and all that sort of thing.'* (P7) *'Planning, planning is a project, or everything is number one. You know get your foundation right, and the building will stay up. Get your foundation wrong the building will collapse.'* (P8) *'So, I'm basically the conduit between all these different parties to make sure that everyone has got the right information that they're all working to the right information as well.'* (P5)
Experience - The level of experience in project management work seems to be a decisive factor in how well project members manage their stress	'The more experienced you are, ... the anxiety will slowly just go away, and then as you face a new challenge, the anxiety will come back again.' *'I guess with experience; you get to the point where, you know, it will still be there tomorrow. So you've got to, oh, there are times where you do, yeah, you have to take your work home, and you do think about things. But on the good jobs, life's a lot more flexible. But obviously, when you get the complex jobs and stuff, it does get very, you forget what personal life is, and it does consume you. But I guess that's where experience comes in. You've got to be able to manage that as well, and not let those things consume you. Like I said, they'll still be there tomorrow.'* (P11) *'I'd say it gets less with the more experience that I gain, definitely. I was more stressed five years ago than I am now.'* (P12) *'I'm as good as my experience, to be honest.'* (P6) *'....with experience and over time the anxiety, not worry but the anxiety, just decreases over time because you go I can prepare as much as possible, the organisation can prepare as much as possible, but if something actually is meant to happen, if you go back, and you do the checks and say "Has this guy done everything reasonably practicable?" the answer would be a yes, and therefore what am I actually worrying about.'* (P10) *I find probably that the younger team members, we got a lot of younger ones here, don't handle it as well as the older more experienced people do.* (P21) *"Yeah, it depends on the confidence that you have and the experience that you have. So, when I was younger, I was a lot more stressed than I am now because now I can foresee things, I can see things happening and I know how to fix it, really.*

Table 5 (*Continued*)

	Whereas when I was younger, it was really stressful because I didn't know what to do, you know, you start panicking a bit more...' (P23)
Relying on teams	*'...it's normally done as a team, so I guess I'm quite fortunate that if you work on big projects you normally have a team of people that can actually pull together that can discover, or uncover, all of the risks that you might encounter.'* (P1)
	'Yeah, I would say always engage your team. Don't try and do it alone. (P6)
	'I would probably say it's about the team. It's all about your team. If you've got a team that you can trust and that listens to you and you're prepared to listen to them, I think that's the best way to de-risk any situation.' (P15)
	'I've not picked up everything, and I daresay I won't miss everything either, and this is why I prefer having a group of people working their way through it, so it's not just one person saying 'Here's my risk register.' It's a group of people saying 'Here's our risk register.' (P6)
Good systems, people and processes reduce the stress attached to managing projects	*'It does help very much to have a systems, processes, and people, in place. If those aren't there and you're managing a project with no support, it makes it a lot more difficult, a lot more stressful. So, I'd like to consider it a collaboration more so than a single individual. We're all managing the project; it's just a single point person if you like being the project manager who's capturing a lot of different ideas from different people'.* (P18)
Gathering information and expertise	*'...it's the magnitude of uncertainty or ambiguity that sort of like really bothers me. And the more I know, the more comfort I get, the more, you know, more relaxed I become. The less stressed, I should say.'* (P19)
	''Yeah, Google, Google is my friend. Like for instance if I'm building a pump station or if I'm building an air warfare destroyer construction facility I will tend to look at previous examples and just read through any news media, you know this is gone well, this is ... I think well how relevant is that? ....' (P8)

An additional coping strategy appeared to be a sense of humour that enabled them to deflect the stress caused, with interviewees often using black humour to express themselves, with quips such as *'Stress builds character'*. Or *'You've got good days, you've got really bad days, like anyone else. Yes, you've got days where you're wading through puddles, you got days when the waves are ten feet high.'*

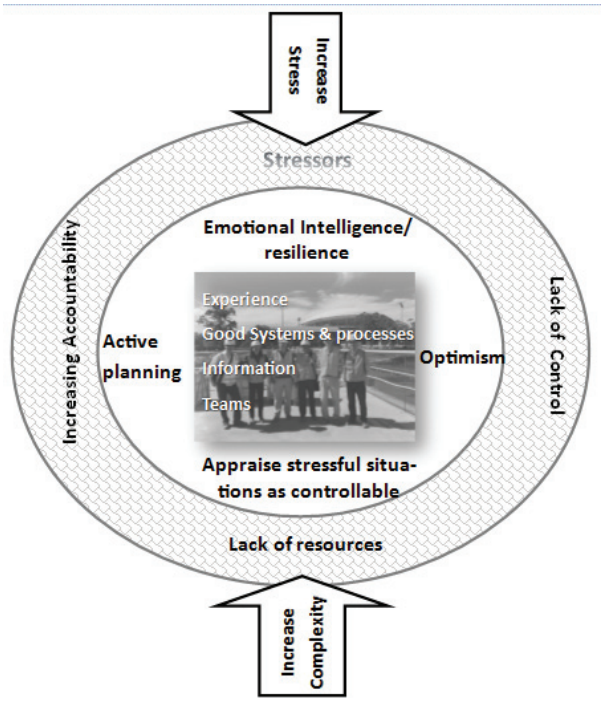

Figure 4 Managing the stressors

Conclusion

The aim of this article was to explore project managers' perception of stress when working in increasingly complex construction projects. The findings showed that stress levels are increasing and that this correlates to the increasing complexity experienced by project managers in the construction industry. The level of stress in a project correlates closely with the degree of uncertainty and correspondingly with the level of complexity of that project. Project managers interviewed believe they are facing increased structural, technical or directional but lower temporal complexity in their projects. What project managers' perceive as causing their stress is consistent with many of the issues identified in the literature. The lack of resources and control, and increasing accountability were the themes that the participants discussed. Internal Stressors such as bureaucracy, lack of opportunity to learn new skills, work-family conflicts and different view from superiors, personal ambitions and expectations, work–life imbalance, the need to 'prove' oneself, long hours work or working to tight deadlines, lack of opportunities for recuperation, inadequate routines, unrealistic timeline, a proliferation of virtual teams and cross-cultural influences, inter-group conflict in organization, developed into themes in this qualitative analysis of interviews.

Experienced project managers interviewed have developed mechanisms to help themselves manage their stressors. The respondents appeared to be very empowered as a group providing a broad view that they are in control of their role and hold an empowered and authorised position within their organisation. Coping strategies include a tendency for project managers to appraise stressful situations as controllable and manageable with more information. The respondents demonstrated optimism, emotional intelligence and undertook active planning strategies where they provided leadership in finding solutions. Stress was also moderated by experience, sharing it with their teams, having good systems and processes and being effective and smart at additional sourcing information, people and data on which to make reliable decisions.

Stress is an intrinsic part of a project manager's job, and this pressure is increasing with the rising complexity and uncertainty surrounding projects. Academics and practitioners need to assess ways to avoid complexity or to reduce its impact on the project manager's role. Stress levels can be reduced by reducing the frequency of stressful situations through the development of project manager's experience, the provision of supportive structures (teams and good systems and processes) and enabling or assisting them to access reliable experts to assess and manage the uncertainty. Recruiting, providing training and enabling project managers to adjust to and manage stressful situations psychologically is important so that they can acquire appropriate levels of confidence, an optimistic attitude, and develop practical leadership tools such as active planning and communication.

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