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What risks are common to or amplified in programmes: Evidence from UK public sector infrastructure schemes

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Abstract

The management of risk is critical in organisations that work in multi-project environments. Project risk management is relatively mature. However, the programme risk management body of knowledge is still evolving. This paper presents empirical evidence from the UK public sector highlighting the risks that are common to or amplified by working in programmes. In the main, these risks are associated with changes in government policy, diverse stakeholder aspirations and the challenges of multiple project procurement. These risks relate to the role of programme management in providing the link between individual projects and their strategic context.

Keywords: Multi-project environment; Projects; Programmes; Risk; Procurement; Public sector

1. Introduction

It is a matter of definition that at a fundamental level, organisations exist for a purpose (Senge, 2006). In the public sector the purpose is generally concerned with the delivery of a service or with the delivery of a beneficial outcome in the public interest (Hill, 1991; Moore, 1997; Financial Times Ltd and University of Chicago. Graduate School of Business, 2000; Finlay, 2000; Joyce, 2000; Grundy and Brown, 2002; Leigh, 2003). The decision to invest in capital infrastructure is therefore usually prompted by a need which is meant to enhance the achievement of this primary purpose (Dallas and Chartered Institute of Building, 2006). Flanagan and Norman (1993) assert that the benefits of risk management are especially evident in capital infrastructure projects because of their dynamic nature and the cost implications of construction related decisions. Flyvbjerg et al. (2003) explain that the need for formal procedures for risk management is amplified in mega infrastructure projects of high value. Whereas Miller et al. (2000) argue that the role of risk management is amplified as project ventures get more elaborate; which is often the case in infrastructure related projects. Thus, risk management should be an intrinsic part of capital infrastructure investment decisions.

As a result of this realisation, risk management is mandatory for capital infrastructure schemes in the UK public sector (PAC, 2001; Cabinet Office, 2002). However, in keeping with the developments in research, the emphasis has generally been on single projects. Risk management in multi-project environments is still an evolving area of research and industry practice (Maylor et al., 2006). This article focuses on programme risks and deals specifically with evidence from the UK public sector organisations. In the context of this article, risk is understood to be an event or condition that may occur, and whose occurrence, if it does take place, has a harmful or negative effect that can adversely affect the prospects of achieving a desired goal. Thus risk management relates to decisions about such potentially harmful or negative effects. This understanding is adopted with a keen awareness of the philosophical and pragmatic implications, and alternative definitions adopted by other authors.

Risk management may generally be synthesised into four basic sub-processes: identification, analysis, response and

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monitoring. Maytorena et al. (2007) observes that the identification phase is critical since it has a big effect on the decisions that emanate from the risk management process. In a review article, Williams (1995) notes that little structured work has been done and published about typical risks, whereas Chapman (1998) points out that while risk identification has a significant impact on risk assessment and response, little empirical evidence exists on this phase. More recently Allan and Davis (2006) and Aritua (2010) have made the same point. Despite these observations, the bulk of risk management research is focused on the analysis and response phases; and yet it stands to reason that if risks are not identified they cannot be analysed and managed. Some researchers have undertaken studies of typical project risks in varying sectors and countries (such as Schmidt et al. (2001) on software project risks; De La Cruz et al. (2006) on construction project risks in Spain; Roumboutsos and Anagnostopoulos (2008) on PPPs in Greece; and Ghosh and Jintanapakanont (2004) in Thailand). These kinds of articles have proved to be a useful knowledge base to researchers and practitioners alike. However, such articles which provide empirical evidence of the inputs — as opposed to the outputs — of the risk management process are rare. Articles discussing typical risks which form the input to the risk management process are relatively few. Moreover, they are largely confined to single project environments. Most of the recent programme risk management research and best practice guidance have concentrated on how to use the outputs and some guidance exists on the process of risk assessment. In this regard therefore this paper constitutes an incremental but crucial step in building a body of knowledge which researchers and practitioners may tap into.

2. The need to investigate programme risk management — a literature review

For the purpose of this paper, the definition of programmes in the OGC Guide Managing Successful Programmes (2007) is adopted:

> 'A programme is a temporary, flexible, organisation created to co-ordinate, direct and oversee the implementation of a set of related projects and activities in order to deliver outcomes and benefits related to the organisation's strategic objectives.…During a programme life cycle projects are initiated, executed, and closed. The programme provides an umbrella under which these projects can be co-ordinated. The programme integrates the projects so that it can deliver an outcome greater than the sum of its parts.'

This definition makes explicit the contrast between achieving *outcomes* in programme management as contrasted with *outputs* in project management. Furthermore the function of linking projects and strategy through programmes is clear.

Risk management has become an important process for organisations that use the project based approach for delivering organisational goals (Miller et al., 2000, Renn, 2008). This may be due to the ever-increasing pressures for improved performance in organisations or from increasingly challenging external environments within which organisations have to exist (Chapman, 2006; Institute of Actuaries. et al., 2006; BS 31100:2008, 2008). Whatever the case, good risk management is considered a critical ingredient for the success of organisational endeavours (Flanagan and Norman, 1993; Akintoye et al., 2003). Several professional institutions such as the *Project Management Institute* (*PMI*), *Association for Project Management* (*APM*) and *Institute for Risk Management* (*IRM*) have undertaken to provide best practice guidance and risk management bodies of knowledge to enable organisations to effectively manage risk and to make decisions. Both public and private sector organisations have tapped into this body of knowledge to provide guidance on managing risk in project environments. Nevertheless, the emphasis of best practice guidance and risk management bodies of knowledge has largely been on single project risk management.

For a long time the general assumption was that programmes are merely scaled up versions or extensions of projects. Hence programme risk management guidance reflected this conception. However, several authors have now shown that the distinction between projects and programmes is crucial. For example, Pellegrinelli (in press) argues that fundamentally programmes must be conceived as being different from projects. As a result the common conception of programme management as an extension or variant of project management needs to change. Shehu and Akintoye (2009) conclude that lack of clear distinction between projects and programmes has a negative impact on effective implementation. Furthermore, based on a comparative bibliometric study of 517 programme management related articles and 1164 project management articles published in the last 21 years in leading scientific and business journals, Artto et al. (2009) demonstrate that programmes and projects need to be perceived differently. These articles reinforce the work of other authors who have made similar arguments (Ferns, 1991; Payne, 1995; Reiss, 1996; Gray, 1997; Pellegrinelli, 1997; Pellegrinelli, 2002; Blismas et al., 2004; Maylor et al., 2006; Martinsuo and Lehtonen, 2007; Pellegrinelli et al., 2007; Aritua et al., 2009; Shehu and Akintoye, 2010). The emerging consensus is that projects and programmes are fundamentally different. The implication is that programme risks must also be perceived and managed differently from project risks.

Maylor et al. (2006) point to the consensus among leading experts that management in multi-project environments is a principal area in which new concepts and approaches are urgently needed to guide practitioners. Recent articles show that the project management research fraternity has responded to the research agenda (such as Aritua et al. (2009); Whitty and Maylor (2009); Smyth (2009); Thomas and Mengel (2008); Gareis and Huemann (2008); Söderholm et al. (2008); Van Donk and Molloy (2008); Winter and Szczepanek (2008)). However, as would be expected of any budding area of research, these articles are about the concepts of managing in multi-project environments. Moreover, articles presenting empirical evidence of how industry practice has progressed are few (Shehu and Akintoye, 2009). Therefore in order to contribute towards the emerging understanding of programme risk management, this paper reports on empirical evidence from

the UK public sector highlighting the risks that are common to or amplified in programmes.

3. Risk management in UK public sector organisations

A range of guidebooks, codes of practice and protocols have been produced to assist the risk management process in project environments. Although there is no specific 'standard' for risk management in UK public sector organisations, principles of risk management are set out in a framework called the *Orange Book* (HM Treasury, 2004). The *Orange Book* provides a basic introduction to the concepts of risk management as a resource for developing and implementing risk management processes in government organisations. These basic principles have been supplemented with more detailed guides such as the Management of Risk (HM Treasury, 2009) and the *Green Book* — Appraisal and Evaluation in Central Government (HM Treasury, 2008). The management of risk guide was produced by the Office of Government Commerce, OGC in response to the government's emphasis on enterprise wide risk management implementation in all organisations. It was designed to encourage a risk based approach to investment decisions.

The various guidelines for risk management used in the UK public sector have been significantly influenced by developments in UK professional institutions. For example, the Risk Analysis and Management for Projects guide, RAMP (2005) is considered to be an authoritative guide for risk management in project environments. It claims to be useful for a variety of situations such as appraising new projects, deciding on whether to invest in a project or lend money for it, assessing projects and reducing risks in ongoing activities. Other organisations such as the Major Projects Association (MPA) have continued to build on the *RAMP* guide and to modify its generic features on a project by project basis. The Project Risks Analysis and Management guide, PRAM (APM, 2004) and BS 6079-3:2000 (2000) have also been modified and adopted for various project situations. Furthermore, the Institute for Risk Management has produced a guide for risk management based on PD ISO/IEC Guide 73: 2002 (2002) which has been widely adopted in IT related projects. The principles from these risk management guides produced by the professional bodies have influenced public sector standards.

Initially the predominant focus of most risk management guidance was on project risk management. However, reports such as the Cadbury report (Cadbury, 1992), the Turnbull report (1999), Supporting Innovation: Managing Risk in Government Departments (2001) and the STRATrisk Guide (2006) emphasised the need to manage risk at the strategic level. This need has been amplified by high profile cases such as Enron, Arthur Anderson, Kværner and Equitable Life, the Hatfield and Cumbria rail crashes and BP's Texas City refinery accident. Therefore organisations increasingly view risk management as central to any decision to invest in capital infrastructure. Both private and public sector organisations increasingly now appreciate that handling risk is paramount. For example, the Cabinet Office report *Risk: Improving Government's Capability to Handle Risk and Uncertainty* (2002) argues that risk management is central to the business of good government. The report proposes that government needs to be able to handle risk at three levels: strategic; programme; and operational/project level.

Project risk management is relatively mature and strategic risk management is the subject of ongoing development. However, a collective body of knowledge on programmes and programme risk management processes is still at its infancy. Therefore for the purpose of clarity the following section explores the conceptual basis for the distinction between projects and programmes in the context of UK public sector procurement of capital infrastructure assets.

4. Programme management and UK public sector procurement of major capital infrastructure assets — a conceptual model

In the UK public sector, the programme management function has come to the fore as a result of changes in procurement. Traditionally, procurement of infrastructure assets was sequential; with a clear separation between the project life cycle phases. The shortcomings and potential negative impacts of this approach to procurement of built infrastructure assets are well documented (Bower, 2003). Efforts to integrate the procurement process and adopt more collaborative forms of project delivery have resulted in the adoption of three main procurement systems in the UK public sector i.e. Prime Contracting; Private Finance Initiative, PFI; and the Design & Build procurement and its variants. The features of these procurement systems such as framework agreements, the use of output based specifications, emphasis on whole life value and integrated supply chains have proved to be conducive to multi-project delivery.

Other recent drivers for change in the UK public sector construction procurement have included formation of the *Office of Government Commerce*, *OGC* whose remit is to ensure consistency of policy and catalyze aggregation and promotion of best practice. In order to take account of the changes in procurement and increase the chances of successful programmes and projects, the *OGC Gateway Review* process was introduced. The process examines high risk projects and programmes at key decision points and offers an opportunity for independent peer review. Closely related to the gateway review process is the development of the business case which essentially contains a written record of the client's plans and decisions. Risk management is central to the business case development process since the business case is based on guidance from the *Green Book* and the *Orange Book*. The OGC best practice guide for public sector procurement also views the business case as a means of obtaining management commitment and investment approval. In this regard, the gateway review process is seen as a framework for informed decision making in order to realise expected benefits. Fig. 1 conceptualises the foregoing discussion and provides a basis for subsequent considerations.

Essentially, the main proposition in Fig. 1 is that a link should exist between Government policy and the desired public service

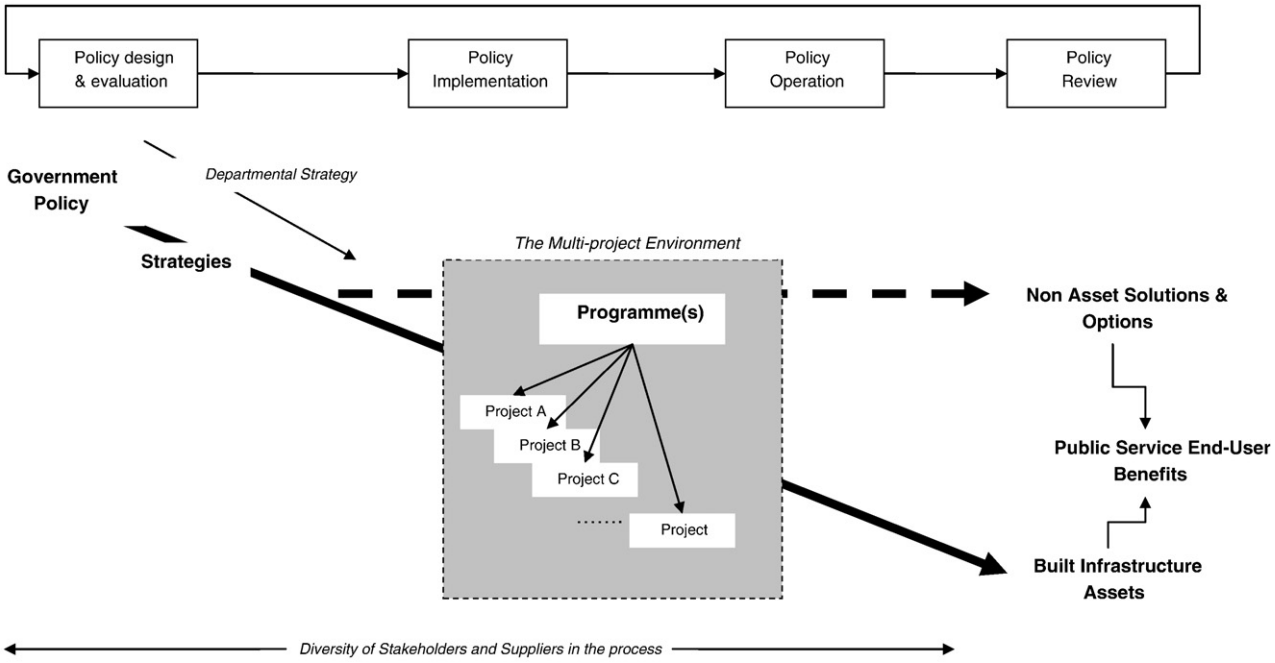

Fig. 1. Programme management and public sector procurement — a conceptual model.

benefits (whether these relate to education, transport, law enforcement, residential and office accommodation or health care). Current guidance from OGC advises that the policy agenda should be kept in focus at the delivery end of benefits realisation. This is possible through a structured process which progresses from policy design, implementation through to operation and review. The policy should result in overall government strategies. Best practice in the whole life management suggests that the alignment between individual departmental strategies and the government strategies should result in change initiatives and a crucial decision point about how the strategies are to be delivered through various change initiatives.

Articulation of the anticipated benefits should assist in deciding the sort of solutions needed and concomitant projects (Johnson et al., 2006). Some of these solutions may be non-asset based, while others may necessitate the construction of built infrastructure such as schools, hospitals, roads or prisons. Whatever the case, recent changes in public sector procurement often result in multi-project environments with a combination of projects which may be construction projects, cultural change initiatives, organisational reconfiguration, or rationalisation of assets (NAMS, 2006). From this perspective, the programme management function is seen as a means for considering issues relating to the content of individual projects and the overall strategic change context (Pellegrinelli, 2002; OGC, 2003; Morris and Jamieson, 2006). The emphasis of current UK government best practice guidance such as *Achieving Excellence* (OGC, 2008) advocates for social change through multi-projects. Thus the conceptual model in Fig. 1 shows that projects and programmes provide strategic fit between policy and organisational strategy, and benefits realisation. This conception aligns with recent arguments by Winter and Szczepanek (2008) that programme management is a value creation activity and arguments by Pellegrinelli et al. (2007) that programme management in this sense is a vehicle for strategic change. In order to achieve their objectives, programme management functions inevitably involve a diversity of stakeholders and suppliers who influence the process and provide input to realising the benefits (Llewellyn and Tappin, 2003).

Risk management is critical to successful programmes. Although some studies implicitly advance knowledge of programme risks, few studies however, have investigated the types of risks that are common to or amplified in a programme environment. The following section discusses the research upon which the findings are based.

5. The research method

A multiple case study approach was adopted (Tashakkori and Teddlie, 2003; Creswell, 2008). The multiple case approach was viewed as more robust than a single case study (Yin, 2009). Five departments which account for approximately 80% of UK public sector capital infrastructure spending were chosen. A summary of the cases is shown in Table 1.

In order to address issues of replicability and validity a *case study protocol* was designed based on the literature review and examination of public sector documentation (Stake, 1995; Robson, 2002). It ensured that the format and methods of investigation between cases were consistent and thus allowed for meaningful cross case comparisons, whilst improving reliability and rigour (Stake, 2006). For data capture, face to face semi-structured interviews based on a set of questions were employed. This allowed for in-depth insight into organisational realities and presented opportunities for secondary questions. The sample size of the interviews was determined by conceptual

Table 1
Basic attributes of the five cases.

	Case A	Case B	Case C	Case D	Case E
Sector	Education	Healthcare	Transport	Defence	Justice
Model of governance and service delivery	Policy set centrally but infrastructure delivery devolved to local authorities	Policy set centrally but infrastructure delivery devolved to local semi-autonomous body	Policy set centrally and infrastructure delivery through an arms-length body	Policy set centrally and infrastructure delivery through an arms-length body	Policy and infrastructure delivery centralised
Nature of projects	New buildings; adapting and extending existing buildings; and refurbishment	New buildings; adapting and extending existing buildings; and refurbishment	Road infrastructure	New housing estates	Major offices and prison accommodation
Unit of analysis	Multi-project environment within the remit of the Local Authority organisation	Multi-project environment set up by the local semi-autonomous body	Programme Management Office	Programme Management Office	Programme Management Office
Mode of infrastructure procurement	PFI and design and build	PFI and design and build	Variant of design and build	Prime contracting and PFI	PFI, design and build, and prime contracting
Programme time horizon	3–30 years	3–30 years	3–10 years	3–30 years	3–30 years

saturation (Guest et al., 2006). Saturation was reached after thirty four in-depth interviews when no new information or themes from the case study protocol were observed in the data. The profile of the interview sample is shown in Table 2.

All the interviewees were either directly related to the programmes within their departments or senior managers who could offer insight into the policy context. The interviews were digitally recorded subject to the interviewees consent and then transcribed and analysed using NVivo software. In addition a number of business cases, which in the UK public sector address risk issues, were studied to establish how programme risks are currently managed.

6. Research findings

Interviewees provided information regarding their view of risks and the risk management processes in a programme environment. Each interviewee was then asked to identify the risks they felt are common to or amplified by working in a programme environment. A list of 370 identified programme risks was compiled from the interviews. Using NVivo software these programme risks were then coded and grouped. The semi-structured interviews allowed the interviewees to provide their perspectives without being biased by pre-determined lists or categories. Stake (2006) cautions that case comparisons should not strip the integrity and individuality of the cases. The cases were therefore treated at the same theoretical level. Cross case comparison was planned and conducted within the case protocol. However, the identity of each case was rigorously maintained throughout the research process, ensuring that each retained its contextual individuality.

Table 2
Profile of interviewees.

Case	Number of interviews	Positions of interviewees
Case A	7 interviews	1 no. Risk Advisor 3 no. Programme Director/Managers 1 no. Capital Assets Manager 2 no. Project Coordinators/Sponsor
Case B	7 interviews	3 no. Project Managers/Sponsor 3 no. Programme Managers 1 no. Senior Responsible Owner
Case C	6 interviews	1 no. Senior Responsible Owner 5 no. Project Sponsors
Case D	7 interviews	1 no. Senior Director/Civil Servant 2 no. Project Managers/Sponsor 1 no. Contracts Manager 3 no. Programme Manager
Case E	7 interviews	1 no. High Risk Gateway Reviewer 2 no. Estates/Facilities Managers 1 no. Commercial Director 1 no. Private Finance Advisor 1 no. Project Sponsor 1 no. Performance and Strategy Director

Close examination of the risks showed that commonalities existed between cases. The risks clustered around certain themes across the cases. Using the Delphi technique, the original categories were refined by representatives from the case studies and two additional experts from academia and industry respectively. The Delphi panellists were asked to assign a numerical severity rating, from one to three, based on the likelihood that a risk would lead either to severe financial impact or undermine the aspirations of the programme. The ratings were then averaged and circulated to the panellists until a consensus was reached about the ratings and their perceived impact. Consensus was achieved after four rounds. Table 3 summarises the fourteen refined categories. Table 3 shows that some risks featured in all the cases, whereas others were only relevant in some cases. As part of the cross case analysis it was evident that Delphi panellists from some cases did not consider some risks to be relevant to their department's multi-project environments.

The implications of the risks in Table 3 may be analysed further by means of the risk radar in Fig. 2. The risk radar is a simple and useful device for capturing and presenting a snapshot of the programme risks identified in the case studies. It also gives an impression of the severity of the risks; as perceived by the interviewees. The risks that appear at the centre of the radar are those that the interviewees and Delphi panellists

Table 3
Summary of programme risks.

Risk code	Particulars	Case A	Case B	Case C	Case D	Case E	Total
R1	Linking strategy and projects	√	√	√	√	√	5/5
R2	Markets and demand changes	x	x	√	√	?	2/4
R3	Difficulties in project delivery	√	√	√	x	√	4/5
R4	Health and safety risks	x	x	√	x	x	1/4
R5	Reputation risk	√	√	√	√	√	5/5
R6	Skills shortage and resources	√	√	√	√	?	4/4
R7	Fraud	√	√	√	x	x	3/5
R8	Cash flow and funding problems	√	√	√	√	√	5/5
R9	Sustainability and environmental legislation	?	?	√	√	x	2/3
R10	Challenges of procurement	√	√	√	√	√	5/5
R11	Competition for contractors	√	√	x	x	x	2/5
R12	Disastrous events and terrorism	?	?	x	√	√	2/3
R13	Stakeholder expectation management	√	√	√	√	√	5/5
R14	Change in government policy	√	√	√	√	√	5/5

Key:
√ — risk category featured; x — not considered a major risk; and ? — not a recognised risk in the case study department.

believed to pose the greatest challenge in programmes. Those on the outer edge — whilst not insignificant — are considered to be of lower impact to programme environments. The middle band represents medium risks. A risk radar was produced for each case study. Nevertheless, analysis of the patterns and the commonalities resulted in the comprehensive radar in Fig. 2. Broadly, the risks may be perceived in three principal categories which provide a framework for the subsequent discussion:

a) Risks that the interviewees felt were common to programmes
b) Risks that are amplified by working in programme environments
c) Risks that are generic to endeavours in project environments

6.1. Risks that the interviewees felt were common to programmes

Most of the risks in this category relate to the programme function of managing multiple projects and aligning projects to organisational strategies/policies.

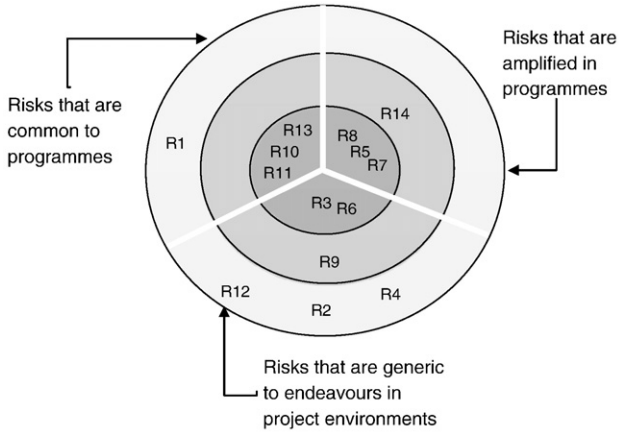

Fig. 2. Programme risk radar.

6.1.1. R14 — political risks and changes in government policy

Political risks lead to changes that alter expected outcomes. All the case studies were from the public sector. However, the political risks associated with each case study depended on whether the procurement was centralised or decentralised. For example the education and healthcare departments (cases A and B) are essentially decentralised in the sense that the detailed decisions on infrastructure are made at the local authority level; although the policy and funding largely originate from central government. In these cases the political risks were more local. Nevertheless, changes in the central government policy inevitably had an impact on the local projects and programmes. Conversely, other sectors such as justice and defence estates are centralised (cases D and E). The procurement process is handled close to the policy decisions. In case C an executive agency was set up to implement policy which is made centrally. In all cases the programme management function had to deal with political risks as evidenced in the interviewee comments.

'For me political risk is everything...' — Interviewee 1

'Risk does not mean that the projects are riskier per se, it means that they have the potential to be risky, to embarrass ministers and the department ……..' — Interviewee 5

'you almost get the sense that the decision to build and how to go about procurement has already been made and your role is to manage the risks associated so that the politician looks good in the eyes of the public…that is what programme management is about' — Interviewee 31

Interviewees and the Delphi experts were also wary of the impact that changes in government policy can have on the vision and aspiration of their programmes. For example, the education and health policies which were generally geared towards centralised delivery shifted towards more local autonomy for services and concomitant infrastructure; along with the implications. Political risk is also related to stakeholder issues next discussed.

6.1.2. R13 — stakeholder expectation management

The risks arising from the influences of stakeholders, their expectations and disparate aspirations featured prominently in the interviews

'The fact that we were procuring a number of projects with different sources of funding and therefore different stakeholders added to the complication.' — Interviewee 13

'…we are keen to improve our consultation processes with local residents and stakeholders and welcome suggestions as to how best this might work from a community perspective. At the same time, we must at all times, act in the best interests of

the projects….the whole process of stakeholder engagement is fraught with risks' — Interviewee 9

'I concede that the current indication for siting new schools has to be one which the school governing body and the Director of Children, Learning and Young People are likely to support….that said, we have to work with residents to produce designs that are sympathetic to their specific concerns. We are also keen to work with residents and interest groups to address concerns over flooding, nature conservation, hours of use, management of traffic and car parking….while at the same time dealing with central government pressures' — Interviewee 23

It may be argued that stakeholder issues and the associated risks are not unique to programme environments (Philip, 2003). However, as discussed in Section 3 and highlighted in Fig. 1, programme management provides a framework to link individual projects to strategy. Consequently, the number of stakeholders inevitably increases in programmes and their influence is invariably more significant. This argument relates directly to the definition of programmes in terms of outcomes and end-user benefits. The criticality of stakeholder expectation management was previously implicit in earlier versions of APMs body of knowledge but the latest edition (APM, 2006) dedicates a new section exclusively to stakeholder management; thus emphasising this important management challenge.

6.1.3. R10 — challenges of procurement

As discussed in Section 3, UK public sector procurement of infrastructure has changed considerably since the 1990s. Currently only three procurement routes are currently endorsed i.e. Prime Contracting, Design & Build and PFI. These are referred to here as integrated procurement routes because of their underlying aspirations to integrate the various asset delivery phases.

In prime contracting, a single contractor is appointed at a very early stage to take on responsibility for the management and delivery of infrastructure schemes using a system of incentivisation and collaborative working to integrate the activities of the supply chain members who may include designers, sub-contractors, suppliers, manufacturers and various other specialists. If the client has a good idea of the expected service outcomes, prime contracting is beneficial. However the experience of the Highways Agency as highlighted by the Eddington (2006) and Nichols (2007) reports underscore the cost implications associated with procurement risks. Adoption of PFI procurement has led to a similar outcome. In PFI procurement, infrastructure schemes are viewed in the overall context of the strategic goals of clients. The emphasis of procurement is not restricted to realising a physical asset but involves the overall success of delivering a service from financing to operating, maintaining and managing. Inevitably, this has led to the involvement of a spectrum of stakeholders including engineers, architects, cost consultants, contractors, lawyers, insurers, financiers, bankers, suppliers, etc. over relatively long periods. Therefore, as would be expected the challenges of dealing with integrated procurement routes featured as major source of risks in programme environments.

'We had dealt with other forms of contracts but PFI was different; especially with the risks involved and the nature of the processes…….' — Interviewee 7

'The whole notion of partnering and early contractor involvement is all very well when no one's toes are trampled on….However, the moment you begin to ask difficult questions the whole process reverts to legal and financial implications. Then you have to bring on board many other advisors….of course at great cost!' — Interviewee 3

Closely related to the challenges of integrated procurement is the fact that current best practice considers that procuring projects in bundles rather than on an individual, stand-alone basis results in increased value for money. The rationale discussed by Merna and Al-Thani (2008) is that if projects are considered individually, some may be commercially viable as stand-alone projects and others may not. However, when projects are bundled together the bundle may the promoters Minimum Acceptable Rate of Return (MARR) and be deemed commercially viable. Part of the challenge of bundling projects is deciding which non-viable projects are to be included in the bundle. Furthermore, private sector bidders often attach a high risk premium to such projects and this may cause the bundle to end up being more costly than would otherwise be the case. The interviews also revealed that in PFI market with few major bidders, this aspect of bundling projects also has a knock on effect on other risks such as competition for contractors and project delivery.

6.1.4. R1 — linking strategy and projects

As expected, this risk is common to the programme management function. However, it was not considered to be high impact or indeed a major challenge. This may be attributed to the fact that most programme managers are appointed with the explicit mandate to link projects to policy and strategy.

6.2. Risks that are amplified by working in programme environments

6.2.1. R5 — reputation risks

Reputation risk was considered to be a major risk that is amplified in programme environments because of the direct relationship between individual programmes and the end-user benefits and stakeholders. All interviewees considered reputation as a prized and yet highly vulnerable asset. This was especially the case in devolved public sector programmes in education and healthcare infrastructure schemes (cases A and B). These schemes receive funding from a central government department which then measures the achievement of the

individual local authority against set targets and in comparison with other similar schemes. Vulnerability to reputation damage was considered to be exacerbated by the media and internet. The Delphi panellists were however divided on whether reputational risk is an issue in its own right or simply a consequence of other risks. The latter view was predominant in more centralised organisations with a longer tradition of structured risk management (cases C, D and E). Reputational risk was generally considered a consequence of failing to deal with other risks. In contrast the decentralised organisations (cases A and B) generally considered it to be a risk that needs to be managed. Significantly, however none of the case departments seemed to be willing to allocate contingency resources to manage reputational risk. In all cases however, reputation risk was linked to issues of stakeholders and politics. It was considered to be amplified in programme environments because the programme manager or the individual performing this role (often the Senior Responsible Owner) had to explain to the funding organisations, end-users and stakeholders how the infrastructure was related to delivery of a public service. Anything that has a negative impact on the image of the programme and its expected benefits has to be dealt with by the programme manager.

6.2.2. R8 — cash flow and funding problems

Issues relating to cash flow and funding represent an increased risk in programmes because individual projects may have different sources. For example in the education sector, funding for school buildings could come from central government, other local authority sources, individual schools and interest groups. A particular organisation could withdraw funding as a result of ethical/policy issues about procurement or they may simply get into financial difficulties that render their source of funding inadequate. In this sense, cash flow and funding risks are exacerbated at the programme level. Several of the interviews highlighted similar cash flow and funding problems associated with this role.

> *'they insisted on using design & build because PFI was considered unethical….what has that got to do with our overarching aim of providing quality education? So now we have to think of a way round this without complicating the process' — Interviewee 33*

6.2.3. R11 — competition for contractors

Competition for contractors was especially considered a major risk in the education and healthcare PFI schemes (cases A and B). As observed by Merna and Njiru (2002) large contracting organisations with a certain critical level of resources and ability to mobilise are key players in the PFI market. At the time of this research, the UK PFI Construction Market analysis (MBD, 2008) showed that there were generally few contractors with capacity to undertake PFI projects. This was especially a problem in education, healthcare and social housing projects. As a result there was fierce competition among local authorities for the few contractors (House of Commons Education and Skills Committee, 2007). To attract private participants many projects are often bundled together to enable the group to be financed as a package. And this has the potential to create additional risks as organisations attempt to deal with the competition for contractors.

6.2.4. R7 — fraud

Closely linked to the risk of competition for few contractors was the risk of fraud. Competition for few contractors shifts the balance of power towards contractors who can then set prices that favour them. Several of the interviewees expressed misgivings about the practice. At the time of this research, the Office of Fair Trade, OFT formally alleged (OFT, 2008) that 112 construction companies engaged in bid rigging activities, and in particular cover pricing. A practice where one or more bidders collude with a competitor during a tender process to obtain a price or prices which are intended to be too high to win the contract. The tendering authority, for example a local authority or other customer, is not made aware of the contacts between bidders, leaving it with a false impression of the level of competition and this may result in it paying inflated prices. In addition, the OFT formally alleged that some contractors had variously entered into one or more arrangements whereby it was agreed that the successful tenderer would pay an agreed sum of money to the unsuccessful tenderer (known as a 'compensation payment') (BBC, 2008). Client programme managers who are responsible for co-coordinating a number of projects found this to be a risk. Nevertheless, the comments on fraud only featured in the organisations that had devolved the procurement process to local level (cases A and B).

6.3. Risks that are generic to endeavours in project environments

Some of the risks that featured in the research may be considered to be generic to any project environment; single or multiple. For example, R6 — skills shortages featured highly in the interviews and it may be argued that this risk is generic to infrastructure projects in the UK. The shortage of engineering and management skills has been highlighted as a going concern for most infrastructure schemes (House of Commons, 2008). The same argument could be made for R4 — health and safety, R2-markets and demand changes and R12-disastrous events and acts of terrorism. Risks relating to legislation R9 and difficulties in project delivery R3 relate to the role that programme management plays in linking public sector policy to built infrastructure and associated services.

7. Implications and limitations of the research findings

The programme risks revealed by the research reinforce the need to distinguish between projects and programmes as management functions in project environments. Furthermore, since the risks highlighted relate to issues which are to a large extent qualitative in nature, the approach to using them as inputs for risk assessment needs to be flexible and adaptable. The implication is that the skills needed to structure these risks in such a way that they inform the decision making process has to

be different from those skills needed to deal with single project risks. McLucas (2003) has proposed that a systems approach whose aim is to understand relationships and to focus on areas of high leverage can result in decisions which emphasise the bigger picture. Aritua et al. (2009) propose that using principles based on complexity science allows programme managers to deal with risk cluster rather than on individual events.

Whilst the standard methods of identification, usually used in combination, are well known and well used, there is still scope for research on how typical risks as highlighted in this article are related to emerging concepts such as uncertainty management in the broadest sense, complexity science and the complex systems approaches, and socio-technical risk management. Furthermore, since programme risks straddle the range between project specific and enterprise wide strategic issues, the relation between technical, cognitive and organisational sub-systems provides additional scope research.

The findings in this paper provide a useful insight into actual risks from the perspective of individuals practicing in multi-project environments. Of course it may be argued that interviews from a broader spectrum would provide a more robust picture of programme risks across the UK public sector. The fact that only five major spending departments were considered is a shortcoming of the findings given that the UK public sector has many departments and agencies involved in programme management. Nevertheless, the case study departments considered represent over 80% of public sector capital expenditure and could therefore be considered to represent a significant sample (HM Treasury, 2007). The findings therefore contribute towards a clearer understanding of this budding area of research and industry practice. The limitations in this regard do not detract from the contribution but rather merely provide a platform for future research.

This paper provides empirical evidence from the UK public sector about the sort of risks that are common to or amplified in programmes. The findings show that because of the important part played by the programme management function in linking individual projects to the overall organisational strategy, programme risks are mainly concerned with political issues, decisions about procurement routes and how to deal with the stakeholders. In sum, the results show that interviewees realised that dealing with programme risks presents challenges which require a different mindset from single project risks. This has implications for the skills set needed to concentrate on the significant areas and to take a holistic view of the project environment and its relation to the overall organisational context.

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