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ENHANCING STRATEGIC PLANNING IN THE UK CONSTRUCTION INDUSTRY

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Abstract

Strategic planning is a key management function which provides future direction and helps determine the competitiveness of companies. Evidence suggests that construction companies put less emphasis in exercising this function than their counterparts in other sectors. In order to understand current practice, a questionnaire survey and a workshop of senior managers in the UK construction sector was conducted, the results of which are reported here. This provides a platform for a proposed process framework for enhancing the strategic planning practices of companies within the construction sector using the principles of scenario planning. The proposed framework was derived from futures literature and evolved through a series of interactions with key construction industry stakeholders. The framework emphasises that the appreciation of relevant external factors and industry scenarios, in addition to the stakeholder engagement throughout the process, helps determine the overall effectiveness of the scenario planning undertaken. Benefit is maximised from having a common understanding of alternative futures, obtained by explicitly capturing perceived future events, drivers and associated interconnectivities investigated in the scenario mapping exercises. This should help UK construction companies involved in the process to better navigate their potential future(s) and hence enhance their strategic planning practices.

Keywords

future scenarios, strategic planning, future studies, research methods, construction, building.

1.0 Background

The impact of the construction industry on the UK economy is substantial. Construction organisations have traditionally had to work in an industry characterised by competitive tendering and small profit margins, whilst also having to be able to respond to fluctuating market demand in order to survive. Construction work often has to be performed in inhospitable or ‘difficult’ environments and the industry still has a relatively poor health and safety record [1]. The industry has traditionally been found to be ineffective at planning for the long-term future and generally lacks forward thinking. A number of reports scrutinising the performance of the sector (e.g. [1]) have called for organisations within the industry to look beyond their next project and prepare themselves better for potential future events and trends.

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Strategic planning is a critical management function which could ensure the long-term survival of construction organisations (e.g. [2]). Here, 'strategic planning' is taken to mean a management function for developing a longer-term plan (beyond the next project), which will shape company characteristics and determine the market in which it is going to operate. Many reasons have been put forward for construction organisations lack of effort in strategic planning [3], most being due to inadequate resource capacities, instability of employment and the unpredictability of the construction market. Strategic planning is often the responsibility of senior managers, though the time that they can dedicate to the task is usually limited as they also have day-to-day operational responsibilities [4]. This problem is compounded due to the prevalence of small construction companies within the sector. Fierce competition and the transient nature of construction employment often results in smaller companies struggling to survive, let alone plan for the long term. Hence, their focus is frequently focussed upon their current project, as well as competing for and winning the next one. If they do plan ahead, then this may have to be abandoned, or at least significantly modified, due to a need to respond quickly to emerging market demands, hence rendering the whole process of long-term planning less beneficial. In most cases, there is little evidence of a formal process in the formulation of long-term strategies [5, 3]. There is thus little capacity for strategic planning in companies in the construction sector and little emphasis on the need for long-term planning as its benefits have not been fully and immediately realised.

Rapid social, economical and technological developments and changes in the last few years have provided many threats, as well as opportunities, for construction companies in the UK and abroad. The existing modus operandi is perhaps no longer sustainable if companies wish to sustain their competitiveness at either a local, national or global level. Hence, the need to plan more strategically and better foresee future possibilities, opportunities and threats is more important than ever before. Enhancing their capacity to help foresee potential alternative futures, and plan for them, is critical if companies are to prepare and adapt to emerging trends and eventualities that may lie ahead. Scenario planning is a promising tool to generate possible, probable and preferred longer-term futures (i.e. 20-25 years) for organisations [6]. This paper provides the basis for developing a potential process planning framework for enhancing a construction company's capacity for strategic planning using scenario planning. Firstly, recent evidence of strategic planning practice derived from a survey of senior construction professionals in the UK is presented. The role of scenarios in strategic planning and the use of causal mapping techniques to capture individual and organisational cognition about the future is also outlined. A proposed scenario planning activity (the framework) within a construction firm is then presented. The paper concludes with a discussion regarding the potential barriers of implementing scenario planning within a construction firm, together with recommendations for approaches to overcome.

2.0 Strategic planning in construction companies

A thorough understanding of current strategic planning practices within (construction) companies is a precondition to improving them. Several studies have outlined the generic approaches of strategic planning practices in construction organisations [3, 7]. A questionnaire survey and a workshop of senior construction managers in the UK was recently undertaken by the authors in order to provide foundation information

regarding strategic planning practices in construction organisations. The findings of the workshop provide a qualitative richness and understanding, which complement the more quantitative survey data. The aim here was not per se, to provide definitive facts based upon a representative sample, but to provoke further thought and discussion and to enhance the knowledge of current practices in strategic planning in construction.

The respondents were then asked whether they had been involved in long-term strategic planning and decision making, and if so, how far ahead their strategic planning looked (in terms of number of years). They were asked to identify events which had had an adverse effect on their corporate strategic planning and the extent to which they can possibly avoid or minimise these given the right tools/ techniques. Additional questions enquired about the tools and techniques that respondents usually used as part of their planning, with multiple choices of common tools/ techniques being provided, including 'SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis', 'gap analysis', 'PESTEL (Political, Economical, Social, Technological, Environmental and Legal) analysis' and 'competitor analysis' (i.e. analysing the behaviour and development of similar competitors).

The final question enquired as to the data and information that the respondent's thought was most useful for their strategic planning, and their relevant effectiveness (in terms of its ability to help then user make the right decision(s)) being recorded on a Likert scale of 1 to 4, where 1 indicates 'poor' and 4 'excellent'. Multiple choices of information were provided, including 'forecasts from internal/ external sources', 'statistics (past data)', 'newspapers and magazines', 'personal contacts' and 'intuition and experience'. The questionnaires were distributed during a UK construction professional institution's annual conference in October 2006. Two of the authors attended the conference and led the delegates through a facilitated process for completing the questionnaires. Forty questionnaires were completed and consequently analysed.

Fifteen delegates attended the workshop including construction consultants, clients, and contractors. Qualitative data was collected and recorded during three parallel breakout sessions. Delegates were requested to address the questions; what strategic planning are they doing?; who does it in their organisation?; and how can they improve their strategic planning?

The majority of the respondents were experienced construction professionals who had been in the industry for a significant amount of time (an average of 24 years). Most (85%) declared their involvement in the formulation of long-term strategic planning and decision making. The length of the future plans that they had been involved in varied, but more than half (56%) had a corporate plan for the next 5 years. Only 18% and 12% indicated that their corporate plans were for 10 and 3 years respectively. Much smaller percentages of them planned for either 1, 2 or 20 years. This concurs with Brightman et al.'s [3] assertion that planning horizons in construction are generally limited to between 3 and 5 years. The future orientation of the industry professionals are also affected by how the industry operates, with one workshop delegate stating:

"We do very little with regard to [strategic planning]... and [adopt a] very reactive [approach to planning].... generally placement to order 3 weeks before [we] get on site, that causes problems. So with regard to planning, we know what we would like to be, we know what we want to achieve in the next five years, but [it is] very difficult given, traditionally how orders are being placed."

Longer-term plans are often sensitive to changes due to social, political, economical and technological developments. The majority (70%) indicated that they have personally experienced events which have had an adverse effect on their corporate planning. Most reasons cited were events over which they have no or little control, such as market slumps/ recession and change in government policies. Current issues such as skills shortage, energy prices and climate change were also cited, indicating their awareness of the possible impacts that these might have on their industry both now and in the future. However, one delegate admitted to having difficulty in understanding the implications of policies at national level on the day-to-day operation of companies;

“... the difficult thing is to actually understand what that [government policies] does it mean to me...ok, that's [the] big picture, it's not real to me as it has not changed legislations, financial services to immediate effect. The industry is still very short-term, in terms of how we plan, how we look at it, the day-to-day stuff....”

Most respondents used a combination of several techniques for their strategic planning, rather than a single isolated technique. 68% used SWOT analysis and 58% used competitor analysis. Gap and PESTEL analyses were used by 32% and 20% respectively. Interestingly, 15% of those respondents who stated they were involved in strategic planning activity did not use any techniques at all. A small isolated number of 'other' tools were indicated including 'mind-mapping', 'what-if scenarios' and 'blue-sky thinking/ brainstorming'. Anecdotal evidence collected from key construction stakeholders during previous workshops and interviews suggests that 'what-if scenario' techniques and brainstorming sessions are often conducted informally amongst key decision makers during discussions in company meetings, for example, as a way of considering alternative options. One delegate stated:

“We do not do [strategic planning] in a structured manner... we don't have need of intense planning [as] organisations, but we can adopt the principles, and make sure that happens. And that happens very much in our company in an informal [way], but there is no measurement, no target setting etc... other than [what] we set budget for....”

Regarding replies for respondents for their strategic planning and its effectiveness, the average responses regarding the effectiveness of data and information used for strategic planning were 'forecasts from internal/ external sources' (2.6), 'statistics (of past data)' (2.5), 'newspapers and magazines' (2.1), 'personal contacts' (2.6), and 'intuition and experience' (2.7), where 1 indicated 'poor' and 4 'excellent'. One workshop delegate experienced difficulty in accessing relevant information, which may prevent them from being more innovative:

“We have difficulty in accessing the relevant market information and statistics on what is going to be in demand [in] 3-5 years time, but because we are an SME, our turnover or projected turnover is a drop in the ocean compared to the overall size of the market... from that perspective, we stick to what we know and improve productivity and achieve [our] target.”

The results highlighted the relative reliance on intuition and experience, as well as personal contacts, in the formulation of strategic plans. These findings suggest a high degree of subjectivity during the formulation of corporate strategic planning based upon a narrow range of limited tools and techniques. The approach is very much top-down, in which senior managers determine the company strategic plan and then they

communicate this to staff. This policy could potentially negate innovative ideas which may emerge from staff at the lower levels within the management hierarchy.

3.0 Scenarios in strategic planning

A scenario can be simply described as a storyline comprising a range of interconnected and uncertain future events and their possible consequences. Scenarios are often employed for decision making activities in which some parameters are uncertain or poorly defined, hence scenario planning techniques' ability to deal with 'wicked' (as opposed to 'tame') problems [8 c.f. 9] . It is not about predicting events or determining the most likely scenario, but developing several plausible stories that describe how the environment in which an entity (e.g. an individual or organisation) lives or operates and may develop, given certain future events, trends, and developments, and then to explore possible 'discontinuities' and 'surprises' (i.e. wild cards) [6].

Scenarios provide a framework to develop and evaluate corporate strategies. The utility of scenarios is often analogous to a 'wind-tunnel' or 'test-bed' for corporate strategic decisions. Scenario planning aims to extend people's views of the future through the thinking and debating of various possibilities, which provides a 'test-bed' for strategic plans, allowing them to navigate their future and choose an appropriate direction. This will enhance the organisational capacity for strategic planning, together with a managers' decision-making capabilities [10 c.f. 11]. However, little is known regarding the conceptual linkage between the decision making process and scenario planning, in terms of how scenario planning enhances the process and its outcome.

Until recently, Chermack [11] explored the core problems that present themselves in the dynamic decision-making process and outlined the use of scenarios in potentially decreasing the unexpected decision failure. He identified four main contributors to decision failure, namely: 1) bounded rationality; 2) an emphasis on exogenous variables; 3) 'stickiness' and friction of information and knowledge; and 4) mental models and cognitive maps with their corresponding decision premises or rules. He also explained how the scenario planning process can reduce the impact of these to improve the effectiveness of the decisions made. Scenario planning makes explicit the mental models of managers for the purposes of analysing, sharing, reconstructing and altering them. Effective decisions should be based upon shared mental models, resulting from a joint decision making process by key stakeholders [12]. The main benefit of scenario planning is derived from the process which facilitates organisational learning for the purpose of continuous improvement. The ultimate outcome is not in the scenarios themselves, but within the process as experienced by the participants. The next step to comprehend this process is understanding what the mental models are and their representations, and how they can be shared, negotiated and altered. This is described in the following section.

4.0 Mapping individual and organisational cognition about the future

Mental models can provide a frame of reference for the interpretation of events or phenomena in life [13]. Mental models govern people's thinking about the future, whether as an individual or as a member of an organisation. People are constantly thinking about future events and their interdependencies. Hence, these events and

interconnections reside within people's minds and are constructed and interpreted based upon the frame of reference, i.e. mental models. These mental models ultimately govern individual's behaviours and actions. Changing this behaviour requires changing or modifying these mental models.

These mental models become more important when people are working in groups, such as teams, organisations or companies, where coherent and concerted behaviours and actions are essential if a group's objectives are to be achieved. Mental models are the basis for the reasoning of behaviours and actions of individuals within a group. People need to communicate and negotiate intentions and plans, which in turn, will be moderated by the other members of the group. This interaction within organisations for the development of longer-term plans is sometimes called 'strategic conversation' [12]. To permit this strategic conversation, we need a media of representation, which makes explicit these mental models. Cognitive maps have been advocated by many scholars to objectively exhibit mental models. In general, a cognitive map is simply a graphical representation of a person's thinking, that locates the person(s) in relation to their informational environments [14, 15]. A number of terms, such as 'mind map', 'brain map' and 'concept map' have sometimes been used to illustrate the same thing. Also, the term cognitive map was initially meant rather differently and used to represent mental models of the relative locations and attributes of phenomena in spatial environments [16, 17]. In this research, we use the term 'causal map' which means a map that exhibits people's perception of a causal network of relationships in a form of nodes and paths [13]. Nodes contain future events whereas paths (arrows) describe causal relationships between these events, that is, a relationship to show that the occurrence of Event A will lead to the occurrence of Event B, or certain actions will lead to particular outcomes. Eden and Ackermann [13] proposed a way of structuring the map according to a tear-drop or pyramid shape, with the goal/ desired outcome at the top, the strategies/ key issues, and assertions, supporting facts and options at a lower level. Figure 1 demonstrates an example of a section of a causal map generated from an interview with the regional manager of a civil engineering professional institution as part of data collection exercise to build industry scenarios in specific areas. In this example, the events are not arranged up and down, but left to right as to allow a sense of time sequence. It addresses the predicted shortage of Chartered Civil Engineers in 2017 due to retirement and decreasing membership. The map was constructed using Decision ExplorerTM software, which has been considered the most advanced computer support for cognitive mapping [18].

The functions of cognitive maps in organisational decision making include: issue structuring (which focuses attention and triggers memory); issue closure (which reveals gaps); and creative problem solving (which highlights key factors and supplies missing information) [14]. Fiol and Huff (*ibid.*) identified three components of cognitive mapping, namely: identity (to identify key actors, events and processes); categorisation (to provide information about the interrelationships of the actors, events and processes); and cause and argument (to provide information about potential interconnections amongst entities of the importance to the organisation through time, i.e. the 'route'). The identity and categorisation components provide the inputs for the causal and argument components. Fiol and Huff (*ibid.*) highlighted the significance of managing these interactive components and balancing multiple and often conflicting components and maps of individuals. Individual maps are unlikely to be identical but they may partially overlap.

Corporate strategic decisions are often made through a process of negotiation amongst stakeholders, in which their idiosyncratic views, interpersonal relationships and politics all come into play. Causal maps can be used for negotiation by the reconciliation of goals, the merging of concepts/ events and the verification of pathways to the future. Integration of individual maps should maintain a balance between unity and diversity. Lack of unity leads to a dysfunctional map, whereas lack of diversity negates creative production of alternative views of the future, and may also stifle innovation (Fiol and Huff *ibid.*).

Eden and Ackermann [13, 15] suggested a way of exposing an individual's causal map to others through a process of 'negotiating' and/or 'merging'. 'Negotiation' occurs when two or more causal maps are going to be integrated by (e.g. organisational or company) stakeholders during a decision-making process. Here, multiple perspectives of an issue facing an organisation are invited. 'Negotiation' often involves 'merging', where two concepts are amalgamated into one in the presence of informants and/or interviewers. Theoretically, two or more events can only be merged if they mean exactly the same thing intrinsically. In practice, this is often difficult as even the same word can mean two different things. Merging events would normally involve ascertaining their meanings to the members of group in a meeting or workshop session. This may lead to three possible outcomes: the events mean exactly the same thing; the events can be merged but need rewording; or the events can not be merged as the team can not find a consensus. The merged maps are referred to as collective causal map. A number of studies have shown that this process is often problematic mainly due to disagreement on language and its meanings, indicating a lack of shared experiences relevant to a particular domain [19, 18].

Figure 2 shows how two small parts of two different causal maps can be merged. The maps were produced from two interviews addressing the problem of labour shortages in the UK construction industry. The goals however, are slightly different, the first concerns the shortage of engineering professionals, whilst the second is about labour shortage in general, and focuses more on construction operatives.

5.0 A proposed process framework for Scenario planning in construction companies

It could be said that there are as many planning frameworks as there are scenario planners. The process framework presented here is not meant to be prescriptive, but to give generic guidance on how the key principles of scenario planning are implemented in this research. Brightman et al. [3] provided an example of developing scenarios in a construction firm, which is different from this framework, mainly in terms of how employee participation is incorporated in the process and the approach in building the causal maps. The scenario planning is not a 'one-off' but a continuous exercise, linking the development of scenarios and the evaluation of strategic decisions against the scenarios and the implementation of the consequent decisions. This process permits opportunities for reflection and re-perception, as examining possible alternative futures from different angles can clarify key issues and help stakeholders to prepare and develop strategies for achieving their preferred futures [20].

Step 1: Appointing a mapping facilitator and selecting representatives

The first step is to appoint a mapping facilitator, which could be an external consultant or an internal member of staff [12]. The person should be a broad thinker with an

ability to understand dissimilar issues of importance to different divisions and levels of organisational hierarchy. He/ she should possess excellent interpersonal skills to enable them to interact with people from a range of levels. A reasonable knowledge of the organisation, in terms of, for example, both 'hard' daily business, operation and organisational structure, and 'softer' interpersonal relations and organisational politics would also help the facilitator to appreciate issues and concerns as well as the underlying message and implied reasoning. Nevertheless, he/ she should be sufficiently detached to maintain an objective view and impartial judgment. This is the balance required between an external consultant and an internal member of staff. An external consultant would bring a new perspective as a view from an 'outsider'. Nevertheless, internal staff with the above skills may be more advantageous to the business or organisation concerned in the long term.

The process begins with selecting representatives from a range of divisions or levels, ensuring those at lower levels are adequately represented. Such representatives would bring benefits in terms of capturing untapped perspectives from different levels, realising the potential benefits of employee participation and empowerment in solving organisation problems. Apart from exploring different views and identifying problems and potential solutions from operational level, this approach will develop a sense of ownership and commitment to ensure a wholehearted support from employees. These representatives will form a 'scenario team'.

Step 2: Constructing individual causal maps using interviews and brainstorming exercises

A combination of brainstorming and interviews is used to construct individual causal maps via a Post-it Note exercise. The aim is to get the most benefit from both techniques whilst compensating for their different weaknesses. Individual rather than group exercises are preferred in order to capture the individual's pure idiosyncratic views in the first instance - group exercises tend to be influenced by the strong personalities and often produce unproductive disagreements [21]. Group exercises can also work against staff at lower levels who feel unable to express their view freely within the presence of their superiors. Facilitator bias in the Post-it Note exercise is also much less than that in the interview. Nevertheless, a recorded interview during the session is useful for the benefits of the later analytical stages in the process, particularly for clarifying any issues when merging and negotiating the individual maps.

The individual causal map is constructed on an A1 paper, where a representative can write events on the Post-it Note and stick on the paper. Post-it Notes ensure flexibility in that it should permit events to be moved freely within the space provided. Cause-and-effect relationships (i.e. arrows) between events can then be drawn - using pencil initially and colour-maker later on. Generally, the map is constructed on a timeline over the next 10-20 years, which does not have to be exact, but is more indicative of the timescale. First, representatives are to identify organisational goal(s), and possibly divisional goal(s), and how both are interlinked (i.e. to build a system of goals [22]). These should be placed on the right-hand side of the A1 paper (i.e. in the future). Then, they write down on the Post-It's the state of the current situation, together with past events which are relevant predecessors to the present situation, and these placed on the left-hand side of the paper (i.e. today). The space in between the envisioned 'goal' and the current situation then provides room for external and internal events to take place within that timescale. External events are those related to the changing

landscape of political, economical, social, environmental and technological developments, which are outside the influence of the organisation. Internal events are possible events happening within the firm, such as changing managing directors or entering new markets, and also possible interventions, such as the recruitment of older workers due to a lack of younger staff (here, to respond to 'ageing population'). The internal events are, to a large extent, controllable by members of the organisation. Awareness of industry trends in a broader sense is relevant to this process. Representatives also need to think critically about possible discontinuities and 'wild cards' that may change the 'terrain' on which the firm has to operate. This ensures that the scenarios will embrace as many future uncertainties as possible.

Step 3: Analysing the individual causal maps

This step includes a number of activities, including desk-work, consultation with representatives and other stakeholders, and preparation for the company workshops. The desk-work converts the Post-it Note maps into a form suitable for communication, and further analysis and manipulation, usually in a computer graphical format with user-friendly software, such as Decision ExplorerTM. This also involves listing the goals, the current situations, future events, interventions and identifying possible common events to merge. It is also possible at this stage to have a brief consultation with the representatives and stakeholders, to clarify any issues arising, discrepancies or confusing aspects, and develop an awareness of the political and social interaction within the firm. The facilitator(s) should be aware of any possible problems arising from these 'intangible but influential' aspects of the firm. The facilitator should then prepare the outline of activities for the group work (i.e. workshop).

Step 4: Discussing causal maps in an organisational workshop

An 'organisation' is a negotiated and social order, which recognises that resolution between members to create a new negotiated order requires a social process that explores the different perspectives, and negotiates as an acceptable way forward [23 c.f. 24]. Hence, it is imperative that this negotiation process is conducted in an open and cooperative basis, where top level management are receptive towards ideas from those at lower levels in order to obtain social and psychological commitment. Once a sufficient number of individual representative's causal maps on the same, or similar, theme(s) have been constructed on a one-to-one basis with the facilitator and the analysis completed, a group company workshop can then be held.

The group discussion opens by the presentation of all the individual causal maps. The collective map(s) developed by the facilitator is then presented. The goals and the current situations are reviewed and the representatives interrogated for possible differences and similarities, and they may then be organised within a hierarchy. The next step is to explore possible pathways to achieve the goals, by scrutinising external events (including discontinuities and wild cards) and the internal interventions necessary to achieve those goals. The merging of events is used to extend the thinking of the participants to alternative ways to achieve a particular outcome. By this time, possible future scenarios for the firm can be identified. It is recommended to identify between 2 to 4 (at most 6) scenarios to reflect the uncertainties and to ease communication [25]. These scenarios should contain an interplay of a range of external events that portray possible future environments in which the firm has to operate. The scenarios are also linked with the final goals and the state of the current situations. Any future decisions for the firms should be trialled using the scenarios. In

this sense, the resulting outcome is envisaged to resemble the characteristics of both strategic explorative and normative scenarios, which not only focus on internal and external factors, but also on certain objectives and how these could be realised [26].

The outcome of the workshop should be communicated to all the staff within the company, whether they were engaged in the process or not, to allow them to reflect on the scenarios and possibly to raise their concern(s) or suggestions. An event inviting them to air their views would provide useful feedback for the scenario team. It is best to consider the scenarios as 'life documents' which are subjected to continual review, update and challenge by organisation members. Regular meetings amongst the scenario team will help this process. The scenario team is analogous to an 'engine of change' for the organisation. The whole process will create an awareness of decision making 'context' for the firm, and improve organisational agility by continuous learning through an established organisational memory.

6.0 Conclusions

There seems to be limited awareness of participating in long-term strategic or scenario planning techniques in the UK construction industry, as illustrated by both recent literature in the area and the quantitative and qualitative data presented in this paper. Scenario planning has the potential to enhance the capacity and capability of construction companies to deal with the dynamic and uncertain nature of the sector. It is also not only beneficial for larger construction organisations, but also for small and medium-sized companies (SME's), which potentially have the embedded flexibility which can be honed by the use of scenario planning. The overall benefit to the organisation should outweigh the investment made as scenario planning has the ability draw upon the true potential and commitment of all stakeholders through the involvement of a company's staff as well as its senior members.

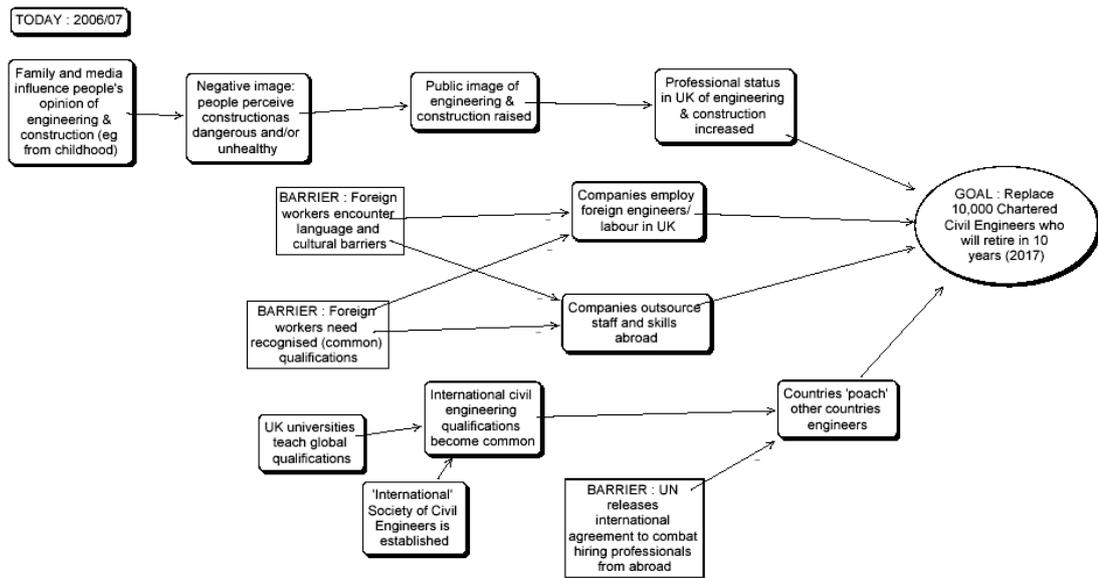
Utilising scenario planning in construction companies could therefore be viewed as the implementation of innovation in organisations. It is reasonable to expect that a large proportion of individuals and organisations may resist, or even disagree, with this proposed framework, especially in a sector traditionally resistant to innovation and change, such as construction. Convincing staff and stakeholders to embrace these techniques would require the explanation and communication of the specific benefits for the company and the individuals involved, and improving (or convincing) the management's thinking regarding engaging with the future. Involving a variety of stakeholders in this process would help to alleviate this problem. Most importantly, trust between those involved (including the facilitator, scenario team, senior management and other stakeholders) has to be nurtured throughout the process as scenario planning can only really be deemed successful if it changes the minds of those stakeholders engaged in the process, a task which in the construction sector history has shown to be notoriously difficult to do.

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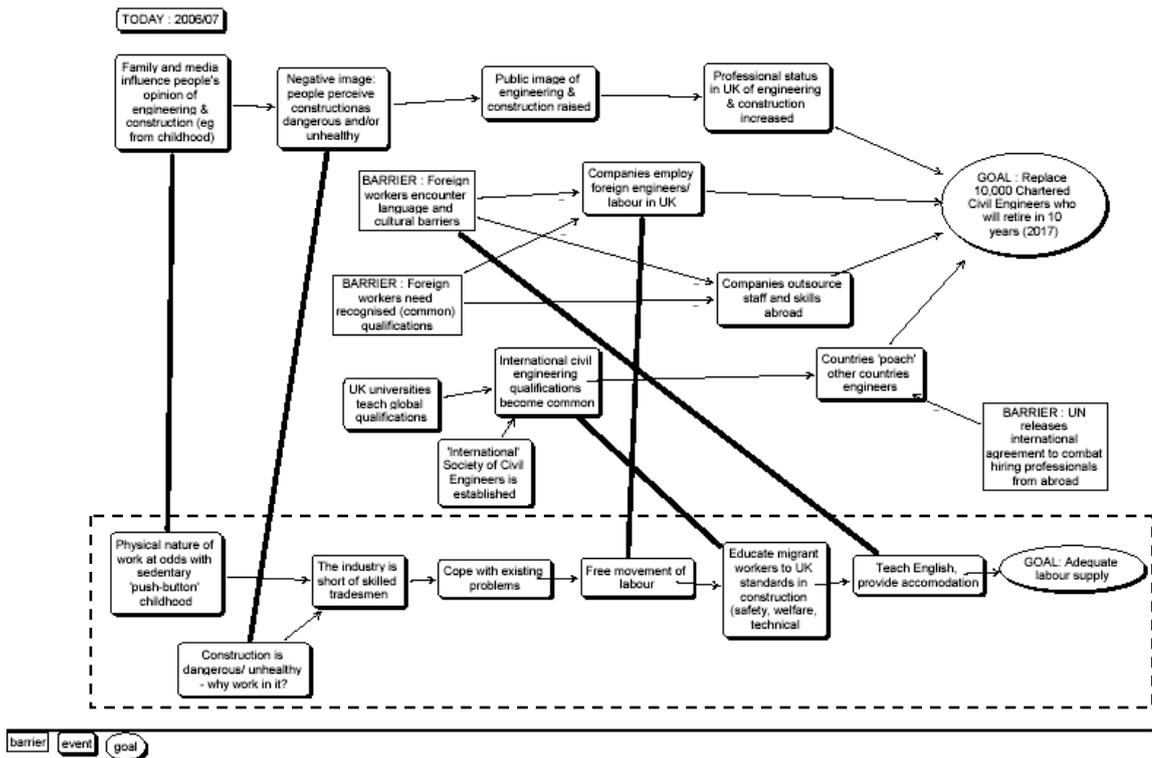
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barrier event goal

Figure 1: An example of a causal map for construction



barrier event goal

Note: bold line indicate linkage between identical events from two different maps

Figure 2: Example of a combined causal map