



Identification and prioritisation of sustainability issues for the UK precast concrete industry

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Abstract

As part of its strategy for more sustainable construction, the UK Government has been encouraging sector representative bodies and trade associations to develop sector sustainability strategies. A four-year research programme aimed at developing such a strategy for the precast concrete industry was therefore established by the British Precast Concrete Federation in 2004, in collaboration with the Department of Civil and Building Engineering at Loughborough University.

In accordance with best practice, the research began with the identification and prioritisation of sustainability issues for the precast industry. A facilitated workshop with key practitioners from the industry identified a series of key business issues for the industry and demonstrated that sustainability was intrinsically linked to the profitability and competitiveness of the industry. A questionnaire survey was then conducted to verify and prioritise these issues across the wider industry. Whilst the survey verified the issues, priorities were found to vary between groups of companies as a result of them being in different phases of a corporate sustainability model.

The research has enabled priorities for the precast sector sustainability strategy to be identified which will facilitate progress towards a more sustainable precast concrete industry in the UK.

Keywords: sustainability; sustainable construction; sustainability strategy

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Introduction

A sector can be defined as a part or branch of a particular area of activity, especially of a country's economy (Hornby, 1995). Sectors can include everything from small groups of large multinational corporations to large groups of small and medium sized enterprises and even collections of individual professionals (SDC, 2002a).

Sector sustainability strategies are an integral part of the UK Government's strategy for more sustainable construction. They encourage industries and businesses to address the sustainability agenda by providing a framework to help business sectors identify and manage economic, environmental and social risks in an integrated way, and unlock opportunities to improve competitiveness and enhance reputation (DETR, 2000). A sector strategy is currently being developed for the precast concrete industry in the UK (Holton et al, 2005).

Best practice guidance based on the cumulative experience of 20 sectoral organisations (Optimat, 2002) indicates that the strategy development process should include identification and prioritisation of sustainability issues for the sector. Research undertaken to identify and prioritise the sustainability issues for the precast concrete industry is described.

The research indicates a link between the profitability and competitiveness of the industry and its sustainability, and that companies in the industry are in different phases of the corporate sustainability model described by Dunphy et al (2003). This has enabled priorities for the sector sustainability strategy to be identified and a sustainable precast industry to be defined.

Research context

Sustainable construction

The construction industry creates and maintains the built environment. Its impact on society is therefore critical since the built environment provides the context for most human activities and has a huge impact on our quality of life. The construction industry also provides employment for approximately 1.5 million people in the UK and accounts for approximately 8% of Gross Domestic Product⁷ (DTI, 2004). Sustainable construction is therefore of significance within the overall concept of sustainable development in the UK. The UK Government has acknowledged this and has also recognised the benefits which could flow from a more efficient and sustainable construction industry (DETR, 1998a).

⁷ The UK's GDP is in the region of £1,000 billion (ONS, 2004).



The UK Government has been making progress towards sustainable construction through its policies, legislations and programmes (DTI, 2003 and 2004), including publishing a sustainability strategy specifically for the construction industry (DETR, 2000). This strategy was intended to make the construction industry:

- more profitable and competitive;
- deliver buildings and structures that provide greater satisfaction, well-being and value to customers and users;
- respect and treat its stakeholders more fairly;
- enhance and better protect the natural environment; and
- minimise its impact on the consumption of energy (especially carbon-based energy) and natural resources.

This encompasses many of the concepts from 'Rethinking Construction', commonly referred to as the Egan Report (DETR, 1998b). Indeed, it has been suggested that adopting a sustainable approach would address the failings of the construction industry as identified in the Egan Report (DETR, 1998b) and lead to significant business benefits, including: better understanding of client needs; identification of opportunities for innovation; increased shareholder value; reduced costs; reduced risk; enhanced public relations and community liaison; and increased employee motivation (CIRIA, 2001).

Sector sustainability strategies

The Sustainable Construction Task Group, in its 'Reputation, Risk and Reward' report (SCTG, 2002), noted that pressures on businesses to respond to the sustainability agenda were increasing from the environmental, social, governmental and investment sectors. The report goes on to list some of the many strategic benefits that good management of sustainability would offer to companies in the property and construction sectors, together with specific operational benefits available to companies that manage sustainability issues effectively. This shows that sustainability is as much about efficient, profit-orientated practice and achieving value for money, as it is about helping the environment. However, the SCTG concluded that there would be a number of strategic management challenges to be faced in the move towards greater levels of sustainability and business strategies would need to be reassessed.

Progress towards more sustainable construction thus requires both government and individual businesses to take actions. However, the government's strategy for more sustainable construction (DETR, 2000) recognised that action would also be required by the construction industry. Sector representative bodies and construction trade associations were therefore encouraged to develop sector sustainability strategies. The reasoning behind this was that "These will provide a framework for sectors to assess their economic, environmental and social performance; identify areas for improvement in the light of future opportunities and threats; set targets and implement action plans to bring about those improvements; and then



to report progress to stakeholders” (DETR, 2000). It was also considered that trade associations which ignored sustainability issues, or tried to fend them off instead of turning them into competitive advantage, were likely to become less effective champions for their members and their sectors (SDC, 2002b).

The construction products industry

The UK construction industry is generally recognised as comprising four principal activities; building, civil engineering, materials and products, and associated professional services (DETR, 2000). Construction materials and products is the largest of these four activity groups with an annual turnover in excess of £40 billion, which accounts for approximately 40% of total construction output, 20% of the UK’s manufacturing output and 4% of GDP (CPA, 2005). This in turn is divided into four main areas, raw materials, fabricated components, fixtures and fittings, and cladding and insulation, which provide employment for over 650,000 people in almost 30,000 companies. Over 40 trade associations exist to serve different interests within the construction products industry (CPA, 2005), suggesting a complex and wide ranging set of concerns and interests.

The precast concrete sector

Precast concrete is an important sub-group of the UK construction products industry; it sells 35 million tonnes of products each year, generating an annual turnover of around £2 billion, and providing direct employment for 22,000 people (Clarke, 2003). Although often considered part of the cement and concrete sector, the precast concrete industry is so large and diverse it can be considered as a sector in its own right.

The diversity of the precast sector is evident in the range of products it produces, the manufacturing processes it uses, and the size and structure of the companies within it. Precast products are made to consistently high quality standards using a combination of skilled labour and automated processes. Mass produced products range from small hydraulically pressed items such as concrete bricks, paving and roof tiles, to larger extruded or wet-cast items such as pipes, piles and floor beams. Bespoke items include large wet-cast products such as cladding panels and structural units designed and manufactured to specific architectural and engineering requirements. There are over 500 precast companies in the UK operating approximately 800 factories; these range from small independently owned single factory operations employing less than 10 people, to divisions of multi-national companies with 10 or more factories and over 1000 staff.

Developing a sustainability strategy for the precast concrete sector



To accelerate the development and implementation of sector sustainability strategies, a best practice forum, the Pioneers Group, was established by two government departments (DTI and DEFRA) in 2001 (SDC, 2002b). Over 40 sectoral organisations covering a range of manufacturing and service industries participated in the Group between July 2001 and June 2003 (Hunter, 2003). Basic mentoring was provided to those organisations starting to develop sustainability strategies, and more advanced mentoring to those involved in implementing strategies and monitoring and reporting their progress.

As a result of the Group's activities a number of documents are now available that can assist in the strategy development process, including a best practice toolkit (Optimat, 2002). This suggests what information a strategy document should contain and provides an outline process for collecting this information, as shown in Figure 1. **[Insert Figure 1]**

One of the fundamental steps to starting the sector strategy development process is to recognise that 'Sustainable Development' is a strategic business issue (Optimat, 2002). Environmental and social issues are having an increasing impact on business performance, and effective management of these issues, alongside traditional economic and financial issues, can help minimise risks and unlock new opportunities and business benefits.

The British Precast Concrete Federation (British Precast) is the trade federation for the precast sector in the UK. Following consultation with its members, British Precast identified the need to develop a sustainability strategy for the precast concrete sector in order to support the competitiveness of the sector and ensure its long-term future (Holton et al, 2005).

Amongst the other best practice lessons identified from the Pioneers Group's activities, was the need to assign dedicated resources, adopt a project management approach and treat strategy development as a logical research and development process (Optimat, 2002). British Precast therefore began a four-year research programme to develop their sector strategy in October 2004, in collaboration with the Department of Civil and Building Engineering at Loughborough University (Holton et al, 2005).

The first stage in the research programme was to identify and prioritise the sustainability issues for the precast sector. The research method adopted for this purpose and the results obtained are described in the following sections.

Research methodology

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Research data was collected in a two-stage process comprising a facilitated half-day workshop with industry practitioners from British Precast's member companies and a postal questionnaire survey of member and non-member companies of British Precast.



Stage 1: Facilitated workshop

The purpose of the workshop was for participants to openly discuss the opportunities and benefits that sustainability can bring to both precast products and precast production, from which discussion a number of sustainability priorities for the industry could be identified. Fifteen technical and environmental professionals from the precast industry attended the workshop and it was facilitated by two members of the research team.

Three tasks were undertaken:

- 1) Divided into three groups, participants were asked to discuss and agree the top 10 business issues for the precast industry at the present time. Each group then presented their findings to the workshop and they were discussed together.
- 2) In the same groups, participants were asked to discuss and agree the actions to be taken against each of the top 10 issues identified in Task 1, including who should take each action. These were again presented to the workshop and discussed.
- 3) Participants were given a semi-structured form and, based on the day's discussions, asked to write their own definitions of 'what a sustainable precast concrete industry looks like'.

Stage 2: Questionnaire survey

The primary purpose of the questionnaire survey was to consult a wider section of the precast industry on the issues identified in the workshop in order to validate and prioritise those issues. The opportunity was also taken in the survey to collect data describing the size and nature of the precast industry, and to investigate aspects of its approach to sustainability.

Following the practices described by Bryman and Bell (2003) for designing self-completion questionnaires and asking questions, a 6-page questionnaire incorporating factual, belief and attitude questions was developed covering the following topics:

- Production
- Customers
- Important issues
- Policies and systems
- The future for precast
- Investment
- Sustainability

Simple closed factual questions were used to collect data on production, customers, policies and systems, and investments. Belief questions were used to assess the significance to companies of a range of business issues and prioritise actions the industry could take to ensure its future, and an attitude question was used to investigate the strength of respondents' views on sustainability. The structure of the questionnaire was designed to



progress from facts to opinions, and from current issues to future issues. In addition to which, the topic of sustainability was placed at the end in order to avoid introducing any bias or suggestion in answers to earlier questions. Development included piloting of the questionnaire by members of British Precast's Sustainability Committee in order to assess its ease of comprehension and completion, and the time required for completion.

The questionnaire was sent to each 'Sustainability Champion' within the 50 full member companies of British Precast⁸ and respondents invited to reply on behalf of their companies. A covering letter jointly signed by the President and Chief Executive of British Precast was used to encourage recipients to reply.

A shorter 3-page questionnaire covering production, important issues, customers and the future for precast, was developed and sent to approximately 400 non-member companies. Since the majority of non-member companies are small to medium-sized enterprises (SMEs), it was considered that certain questions or parts of questions were not relevant to them and that by eliminating these, and reducing the length of the questionnaire, recipients would be more willing to complete it.

Results and analysis

Presentation of the research results in this paper will concentrate on the identification and prioritisation of sustainability issues for the precast industry. Other aspects of the results will be covered in future research papers.

Stage 1: Industry workshop

The business issues identified by each group in the first task are shown in Table 1. From the subsequent discussion, it was clear that the fundamental business concern of participants was the profitability and competitiveness of both individual companies and the precast sector as a whole. In regards to which, the other issues were all considered to be contributory factors. **[Insert Table 1]**

With many of these other issues duplicated or overlapping, a list of key factors affecting the profitability and competitiveness of the industry was proposed and agreed for use in the next task; these are described in Figure 2. Consideration of these factors shows them to comprise a range of economic, social and environmental issues, either directly or in combination. Since

⁸ Each full member company of British Precast has nominated a 'Sustainability Champion' who provides the first point of contact between the company and the Sector Sustainability Strategy project team.



sustainability also consists of a combination of economic, social and environmental issues, this suggests that the profitability and competitiveness of the precast industry is intrinsically linked to its sustainability. This is of significance because there is a growing consensus in the UK as to the competitive advantages that can be conferred by businesses taking a sustainable approach (Bennett and Crudgington, 2003). **[Insert Figure 2]**

A wide range of specific problems and actions to be taken against each factor were discussed in the second task. The actions proposed can be summarised as requiring the industry to be more responsive and responsible, to improve its internal practices and performance, and reduce its external effects, and the actors responsible were considered to be individual precast companies, their supply chain partners and their trade association. These views were repeated and reflected in many of the definitions of a sustainable precast industry proposed by participants in the final task. A sustainable precast industry has therefore been defined as one which:

- is profitable and competitive;
- is responsive and responsible in all aspects of its business; and
- strives to improve its internal performance whilst reducing its external effects.

Stage 2: Questionnaire survey

Completed questionnaires were received from 29 member companies, a response rate of approximately 55%, whilst 34 non-member companies responded to the shorter questionnaire, a response rate of approximately 10%. These companies together operate nearly 200 precast factories, with an annual turnover in excess of £1.6 billion. Since the total annual turnover of the precast industry is currently estimated to be in the region of £2.3 billion, the response received can therefore be considered to represent approximately 70% of the industry.

The factual data collected on production and customers showed the precast sector to be diverse in the range of products it produces, the size and structure of the companies within it, and its customer base.

There are ten principal precast product groups covering both mass produced and bespoke items:

- 1) Architectural cladding
- 2) Cast stone and other decorative
- 3) Drainage inc. pipes, culverts and manholes
- 4) Flooring inc. beam and block, and hollowcore
- 5) Masonry inc. blocks and walling
- 6) Paving, landscaping and street furniture
- 7) Piles and foundations



- 8) Railway specific products
- 9) Roof tiles
- 10) Structural inc. beams, columns and panels

Flooring, structural components, masonry and paving products, were the most popular product groups for companies to operate in, and companies would typically operate in more than one group, however, insufficient data was returned to reliably define the size of each group.

The respondent companies varied in size from single factory operations with less than 20 employees, to divisions of multi-national corporations operating multiple factories and employing over 1,000 staff. Whilst this disparity in company size reflects the diverse nature of the industry, it also means that a small number of companies have the ability to dominate or lead the industry. Figure 3 is a graph of the cumulative annual turnover of the respondent companies; it can be seen from the graph that six companies, each with a turnover in excess of £100 million, account for over 50% of the reported figures. **[Insert Figure 3]**

Data provided on customers showed the industry to have a wide customer base for its products, ranging from local to national companies and including organisations such as local authorities and government, within which contractors, builders and builders' merchants were the primary customer groups.

Respondents' beliefs on business issues of significance to the precast industry were investigated using a list of 20 issues derived from the workshop, as shown in Table 2. Member companies were asked to rank their top five issues in order of importance and note any other issues of concern, whilst non-member companies were simply asked to identify any issues of concern. The opportunity was also given in both cases to add issues to the list.

[Insert Table 2]

All of the issues listed were identified to be of concern by at least one respondent, validating the list created, and no further significant issues were added. Four methods were used to prioritise the list, the results from which are shown in Table 2:

- 1) Member companies' responses were reverse weighted, i.e. 6 points for the highest ranked issue, descending to 2 points for the fifth ranked issue, and 1 point given to any other issues of concern;
- 2) The responses from those member companies with turnovers > £100 million were reverse weighted as in method 1;
- 3) Non-member companies' responses were ranked by frequency of occurrence; and
- 4) All responses were combined and the issues ranked by frequency of occurrence.



Although health and safety was the highest priority in all cases, a number of economic issues were found to be of consistently high priority including cash flow and payment practices; competition from other products and materials; health and safety; and profitability and competitiveness. This supports the workshop finding that the top priority of the industry is its economic performance, represented by its profitability and competitiveness. Issues found to be of lower priority in all cases included community relations; planning restrictions on factories; poor image of the industry and its products; and variability in buying decisions. However, there was no clear and consistent pattern of priorities across the industry because certain issues were clearly of higher priority to some groups of companies than they were to others and vice versa. For example, maintaining a good return on assets to sustain future investment, customer consolidation and over capacity in the industry were high priorities for those companies with annual turnovers > £100 million, but not the non-member companies. Government policy, legislation and taxes, raw materials, and transport and distribution costs were higher priority issues for the non-member companies than they were for the larger companies.

The existence or development of policies and procedures in companies was investigated in order to provide an indication of whether the industry was beginning to address those business issues relating to environmental protection, resource use and social progress. The results with respect to the 10 areas selected for investigation are shown in Figure 4; the industry clearly has a higher level of adoption of policies and procedures in some areas than others. Those companies with turnovers > £100 million had policies and procedures in place in all 10 areas shown. **[Insert Figure 4]**

Implications for the precast sector sustainability strategy

The purpose of the research undertaken was to identify and prioritise the sustainability issues for the precast industry. Whilst sustainability issues have been identified for approximately 70% of the industry, the priority of these issues was found to vary between different groups of companies. Experience from the Pioneers Group (Optimat, 2002), suggests that one strategy might not meet the needs of all groups within a complex sector. However, Dunphy et al (2003) describe six phases in the development of corporate sustainability, as shown in Table 3. Certain companies in the industry, typically those with turnovers > £100 million, are recognised as operating in the higher phases of this model because of their good environmental and social performance, and contribution to the emergence of a sustainable society. Others are in the middle phases, showing increasing awareness of sustainability issues, whilst the response rate to the questionnaire suggests that 30% of the industry is in the lower phases, rejecting or not responding to the issue of sustainability. On this basis, differences in the sustainability priorities of companies in the industry are to be expected, and



a priority for the sector sustainability strategy must be to engage with the whole industry and to facilitate the progression of companies through the phases of the sustainability model.

[Insert Table 3]

Woodall et al (2004), reporting research conducted in 2002/03 amongst 145 managing directors, showed that 'legislation' in the form of government policy was considered to be the primary driver towards the adoption of more sustainable business practices in their organisations. However, the UK Government's revised Strategy for Sustainable Development published in 2005 (DEFRA, 2005) proposed a new approach to influencing behaviours focusing on measures to encourage behaviour change, rather than measures to force change. This suggests that encouraging change is more effective than forcing change. The precast sector sustainability strategy must therefore adopt a similar approach and encourage change in the industry.

Consideration of the factors identified as key to the profitability and competitiveness of the industry and therefore its sustainability, as described in Figure 2, shows that three are pan-industry issues: external threats; legislation; and market image. As the industry's trade association, British Precast exists to manage these issues on behalf of the industry (Clarke, 2003). The other issues, relating to internal performance and external effects, need to be addressed at company level with the support of British Precast and the industry's supply chain. The investigation into the adoption of policies and procedures in companies relating to environmental protection, resource use and social progress, showed the industry to have a higher level of adoption of policies and procedures in some areas than others. Since these are all aspects of sustainability, this suggests that some companies are more sustainable than others in accordance with the sustainability model of Dunphy et al (2003) described previously. Actions to encourage the adoption across the industry of policies and procedures in respect of key aspects of sustainability would be a first step in facilitating the progression of many companies through the phases of the sustainability model.

Conclusions

The sustainability issues for the precast industry in the UK have been identified through a workshop and verified across approximately 70% of the industry (by turnover) through a questionnaire survey.

Profitability and competitiveness was shown to be the most important issue for the industry and key factors affecting this were identified. Consideration of these factors indicates that the profitability and competitiveness of the industry is intrinsically linked to its sustainability, since they comprise a range of economic, environmental and social issues.



Different groups of companies were found to have different sustainability priorities as a result of companies in the industry being in different phases of a corporate sustainability model. This has enabled priorities for the sector sustainability strategy to be identified, including engaging with the whole industry and encouraging companies to be more responsive and responsible in all aspects of their business.

Addressing these priorities should facilitate progression towards a more sustainable precast industry, an industry which is profitable and competitive, is responsive and responsible in all aspects of its business, and strives to improve its internal performance whilst reducing its external effects.

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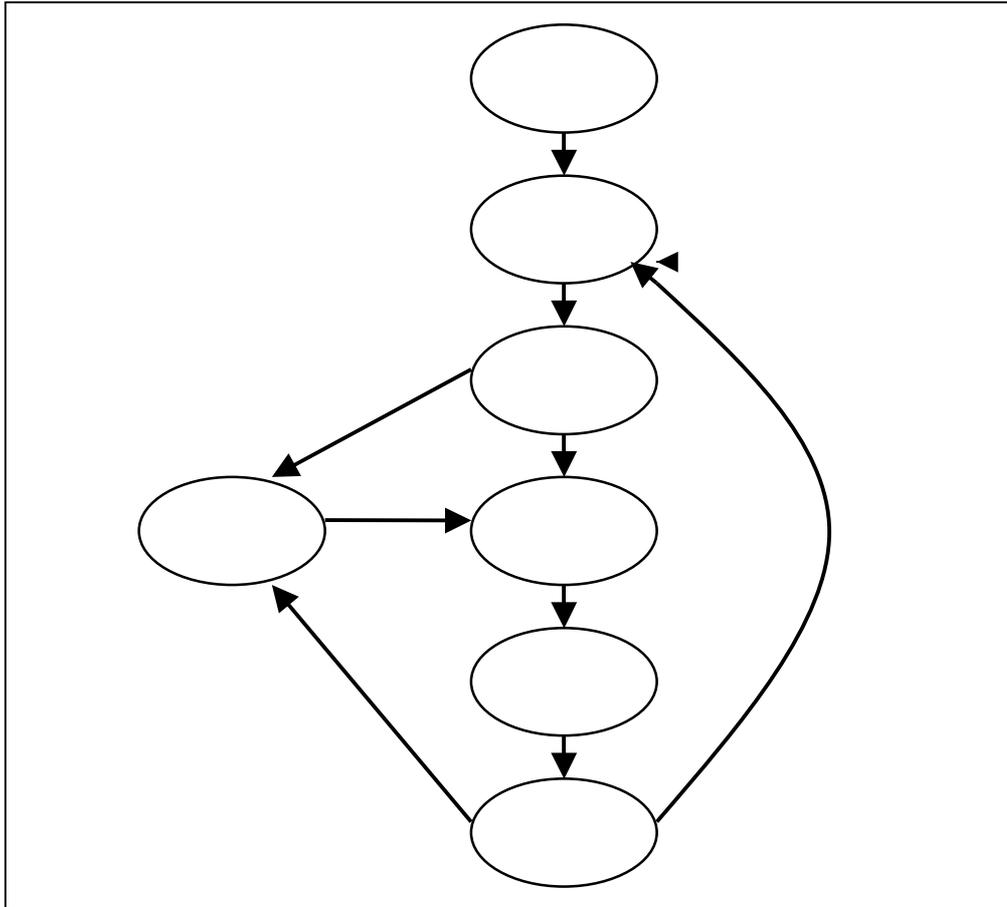


Figure 1: Sector sustainability strategy development procedure (Optimat, 2002)

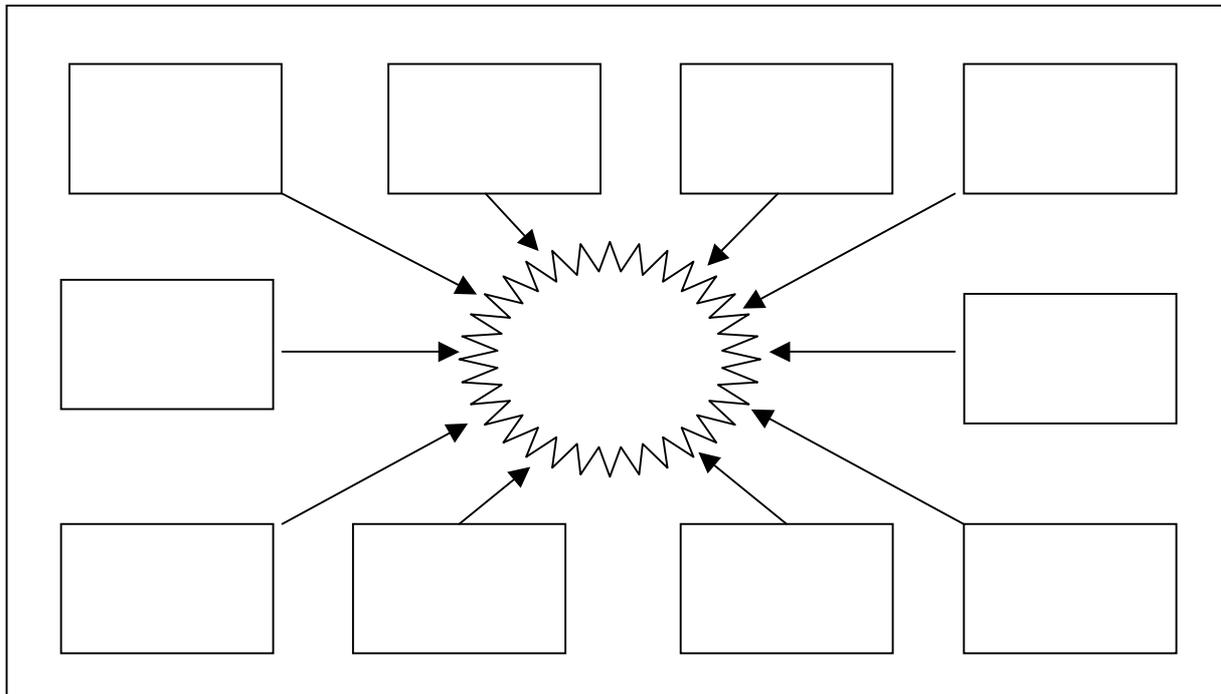


Figure 2: Key factors affecting the profitability and competitiveness of the industry

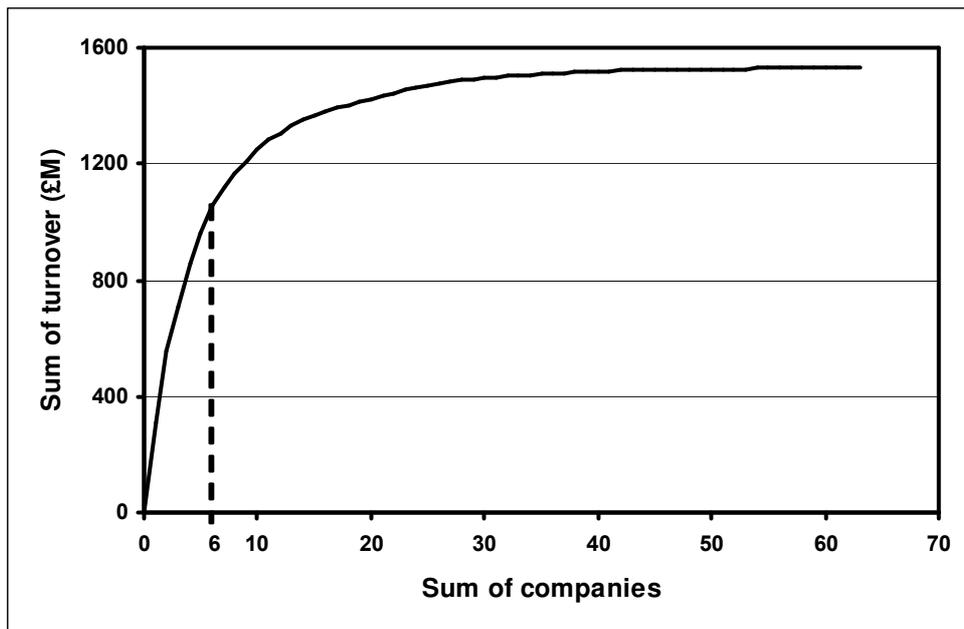


Figure 3: Sum of annual turnover of respondent companies

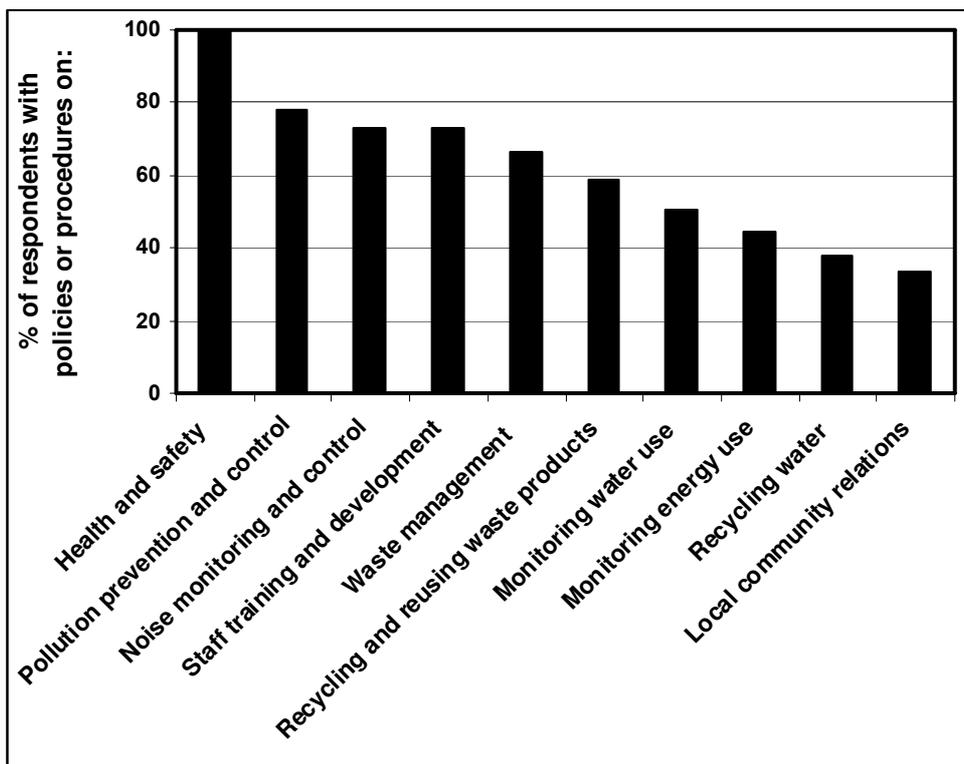


Figure 4: Prevalence of policies and procedures in the industry



**Table 1: Top 10 business issues for the precast industry,
 as identified by the three workshop groups**

Group 1	Group 2	Group 3
Skilled human resources	Instability in energy market	Profitability and competitiveness
Economic resources	Environmental impact of product and agreement of rating	Employment issues (training and retaining)
Legislation	Image of industry (community relations and recruitment)	Poor image (e.g. concrete vs. timber)
Market demand	Health and safety in production and use of product	Raw materials (availability and cost)
Waste	Competition from alternative materials	Cheaper foreign imports
External threats	Transport concern of heavy input materials and output products	Waste management
R&D (innovation)	Sustainability concerns of specifiers not reflected in purchasing policies	Community relations
Accounting and supply chain	Availability of virgin and recycled aggregates	Rising energy costs and difficulty of supply
Health and safety	Increasing legislative burden	Transport and distribution
Social acceptance	Waste management in general, packaging in particular	Over capacity in the industry



Table 2: Prioritisation of business issues for the industry

Issue	Priority			
	Method 1	Method 2	Method 3	Method 4
Cash flow and payment practices	4	5=	2=	3=
Cheaper foreign imports	13	12=	17	16=
Community relations	19=	17=	20	20
Competition from other products and materials	3	3=	8	3=
Customer consolidation	12	5=	13=	14
Employment issues including recruitment, training and retention	10	15=	10	9=
Energy and climate change	14=	10=	15	15
Government policy, legislation and taxes	14=	14	2=	8
Health and safety	1	1	1	1
Maintaining good return on assets to sustain future investment	5	3=	9	7
Over capacity in the industry	7	5=	13=	13
Planning restrictions on factories	18	19=	16	18
Poor image of the industry and its products	16=	19=	18=	16=
Profitability and competitiveness	2	2	5=	2
Raw materials including price, availability and taxes	8	9	4	6
Regulations and regulatory trends	11	12=	7	9=
Slow down in markets and the economy	6	8	11	11
Transport and distribution costs	9	10=	5=	3=
Variability in buying decisions, e.g. price, green, whole life cost	19=	17=	18=	19
Waste management and pollution control	16=	15=	12	12



Table 3: Phases of corporate sustainability (after Dunphy et al, 2003)

Phase	Description
Rejection	"We exist to make a profit and the wider community does not have legitimate claims on our business. We think that all greens are anti-social activists. At best, we pay lip service to the environment."
Non-responsiveness	"We don't oppose sustainability, but we just don't understand it. We tend to operate a 'business as usual' approach. Environmental consequences are taken for granted, or if negative, ignored."
Compliance	"We are a decent employer and corporate citizen because we avoid environmental abuses that could lead to litigation, but we do tend to have a reactive attitude to legal requirements."
Efficiency	"We are becoming aware that there are advantages to be gained from using sustainable practice. For example, some of our waste may be a valuable resource to others."
Strategic pro-activity	"We view sustainability as a potential competitive advantage and try to position ourselves as a leader in sustainable business practices. Our commitment is still bedded in profitability."
The sustaining corporation	"We voluntarily go beyond profitability to promote sustainable values and practices. Sustainability is strongly internalized and we have enlightened attitudes towards our role in society."