Competitive Advantage, Strategy and Problem Structuring: Revealing the Role of Managerial Cognitive Asymmetries

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ABSTRACT

The resource-based view of strategy (RBV) seeks to explain why some firms consistently outperform rivals in the same industry by acquiring a unique set of strategic assets (or resources). We suggest firms achieve competitive advantage through 'cognitive asymmetries' (differences between dominant managerial mental models) that lead rival management teams to implement distinct resource building strategies. This managerial and cognitive view of competition and rivalry lends itself to investigation through problem structuring methods. We suggest that resource maps, as a problem structuring method, can be used to interpret managerial mental models for strategic decision-making in terms of resource building processes. Through resource maps, we represent the system of asset stocks believed to be most important for driving business performance. We illustrate the framework by comparing and contrasting maps of the system of resources (asset stocks) that best characterise the four leading firms in the UK Commercial Radio Broadcasting Industry.

INTRODUCTION

Penrose (1959), an influential economist, has suggested that firms are collections of productive resources, harnessed through managerial decision-making processes, offering customers attractive product and services. For a firm, resources and products are two sides of the same coin (Wernerfelt, 1984). To make products requires the deployment of several resources and most resources can be used in several products. Consequently, by specifying the commitment of the firm to a product market, it is possible in principle to infer the minimum requirements of resources to compete effectively. Conversely, by specifying a resource profile, it is possible to find the set of product-market activities where a firm will be able to compete efficiently (Wernerfelt, 1984; Barney, 1986). Consequently, the enduring and systematic performance differences among relatively close rivals in an industry are determined by strategic decisions responsible for developing a portfolio of resources over time – a perspective known as the resource based view of the firm RBV (for a review see Foss 1997).

However, one of the central characteristics of strategic decision-making is its lack of structure. Strategic decisions occur relatively infrequently and involve ambiguous data and possible disagreement about which data are relevant. Strategic problems, which do not have a clear formulation, are extremely difficult to describe. Additionally, feedback about the success of a strategy is often ambiguous because there are multiple criteria available to evaluate outcomes, which may not be observable immediately after implementation (Schwenk, 1984). In other words, strategic problems are ill structured problems (Rivera Ungson *et al.,* 1981).

Since managers handle complex and ambiguous strategic problems using their mental models to represent their information worlds and facilitate information processing and decision-making (Walsh, 1995), management's dominant logic controls the portfolio of resources over time (Morecroft, 2002). Therefore, the organisational outcomes in terms of

firm performance and competitive advantage, are, in a philosophical yet practical sense, reflections of managers' values and cognitive biases (Hambrick and Mason, 1984). In other words, firms can be viewed as top management mental models (an interpretist view of business) transformed into real organisations (a functional view of business). This transformation from the world of ideas and intentions to the practical world of competing firms is the basis of our paper and our argument that problem structuring and competitive advantage are related.

Resource Portfolio Management

Our argument is echoed in contemporary strategy literature. Schwenk (1995) reports that decision-makers' cognition is receiving increased research attention because of its central role in strategic issue diagnosis and problem formulation. Our work fits this emerging paradigm by taking a cognitive view of resource portfolio management, a key strategic decision making process under the resource based view of the firm.

In our approach the process of building resources comprises two distinct components: *resource conceptualisation*, which is a creative managerial cognitive process (Schwenk, 1984; Walsh, 1995); and *resource management*, which encompasses the operating polices that guide asset stock accumulation (Dierickx and Cool, 1989). The result of accumulating strategically relevant asset stocks is distinctive *firm performance*. Then firm performance feeds back to reinforce or undermine the initial conceptualisation of the set of relevant resources as figure 1 depicts.

INSERT FIGURE 1 HERE

Resource conceptualisation

Managerial mental representations or knowledge structures of the resource system are not a direct imprint of reality but a result of complex selection, sorting, manipulation and conversion processes shaped by the experience and existing knowledge of individuals with the power to act (Walsh, 1995; Eden and Spender, 1998). In other words, managers' mental models affect what they see, and two managers with different mental models can observe the same industry or even the same firm, and conceptualise not only the resource system differently but also suggest different relevant resources to achieve competitive advantage. Consequently, managers can gain a competitive advantage simply by exploiting limited and diverse representations of the resource system existing in the industry – which we define as cognitive asymmetries.

Resource management

Once the management team has conceptualised and communicated the set of strategically relevant resources, they then have to build and develop the resources over time. We define this component of decision-making as resource management. Using information feedback concepts from system dynamics we represent resource management as purposive adjustment of resources through asset stock accumulation and goal-seeking information feedback (Morecroft, 2002). Resource management decisions lead to corrective actions intended to close observed gaps between desired and actual resources.

Defining and monitoring the gaps (shortages or excesses) in a firm's portfolio of resources is essentially an information processing activity. Such information processing is imperfect, judgmental and behavioural – subject to the practical constraints of bounded rationality (Morecroft, 1985; Sterman, 2000). Every manager has available a large number of information sources to gauge the firm's resources. But each manager selects and uses only a small fraction of all available information. Through this behavioural decision-making process,

managers collectively build and configure the set of strategically relevant resources for competing in the industry.

The Role of Problem Structuring Methods in Strategic Decision Making

Strategic decision making to achieve a competitive advantage has many of the characteristics of unstructured problems described by Mingers and Rosenhead (Mingers and Rosenhead, 2004) :

- *Multiple actors:* Organisations operate in competitive environments formed by tightly interconnected networks of rival decision makers whose decisions cannot be ignored by any one firm because the decisions impinge on each other.
- *Multiple perspectives:* As senior managers in the same firm do not usually know or agree the best set of resources to compete in an industry, it is even more difficult for them to know what managers in competing firms believe to be the best set of resources.
- *Conflicting interests*: Organisations tend to compete rather than co-operate most of the time because they are responding to firm specific goals, shareholder pressures and governmental regulations.
- *Key uncertainties*: Decision makers' choices in a given firm will undoubtedly affect pay offs in the network of rival firms and decision makers, but it is very difficult for any stakeholder to infer the best contingent strategy. To do so they would have to foresee competitor reactions and anticipate a competitive equilibrium of the kind suggested by industrial organisation economics (IO) researchers who have studied industry competition using the theory of non-cooperative games (Tirole, 1990). In practice competitive strategy, move and countermove, is fraught with uncertainty

because decision makers are boundedly rational and lack the information and inference skills to reliably predict the behaviour of rivals.

Thus, it is reasonable to expect that problem structuring methods such as SODA, Robustness Analysis and Drama Theory (Mingers and Rosenhead, 2002) can help to analyse and facilitate strategic decision making. Indeed SODA, supported by cognitive mapping and based on personal construct theory, has been further developed specifically for strategy making and strategy delivery, a methodology known as JOURNEY Making (Jointly Understanding, Reflecting, and Negotiating StrategY) (Eden and Ackerman, 1998). We are proposing something analogous, a problem structuring method particularly suited to analysing and understanding differential firm performance and competitive advantage, based on concepts from system dynamics and the resource based view of the firm (RBV). This synthesis of ideas from OR and strategy leads us to use system dynamics diagramming tools to support strategic decision making and the analysis of competitive behaviour.

Resource Maps as a Problem Structuring Method for Resource Portfolio Management

Unlike cognitive mapping we are not looking for mean-ends relationships (Eden and Ackerman, 2004) underpinning strategy but instead for the 'strategic architecture' (Warren, 2002), which is the set of resources perceived to be strategically relevant for competitive advantage and responsible for firm performance. Therefore, the question driving resource mapping is:

What are the set of resources perceived by managers to be relevant for superior firm performance?

Thus, in this interpretation of mental models for strategic decision-making we represent top managers' conceptualisation of their firms and strategy in terms of resource building. We

admit this is a stylized way of portraying managerial mental models but it has the advantage that we can link mental models to firm performance over time. So 'resource maps' are pictures or visual aids to comprehend elements of managerial thought related to resource building and competitive strategy (Eden, 1992). In that sense, we see 'resource maps' as facilitative devices (analogous to SODA - Eden and Ackerman, 2002) for use with individuals or groups for problem solving and negotiation about strategy. Through a resource mapping exercise, the dominant logic in the management team driving resource building and resource allocation is available for analysis, which increases the transparency of strategic decision making for those most closely involved (Eden, 1992).

'Resource maps' are essentially stock and flow diagrams (see Sterman 2000, ch.6) and are conceptually similar to strategic architecture maps (Warren, 2002). However the choice of which stocks and flows to model is informed by ideas from RBV and strategy about the need for *unique* configurations of resources to underpin competitive advantage. In resource maps, 'stocks' are used to represent diagrammatically resources or asset stocks using the description suggested in Barney (1986) and Dierickx and Cool (1989). The chosen resources are perceived by managers to be strategically relevant because they confer competitive advantage over rivals. 'Flows' depict increases and decreases in the level of resources, controlled by implicit or explicit operating policies (Morecroft, 2004). Finally, a web of 'connectors' represents the perceived causal attributions that, through operating policies, link resources to the accumulation rate of other resources in the firm. To conclude, a stock and flow diagram has all the formalities (Sterman 2000, ch. 6) required for a system dynamics model, but a 'resource map' is just a picture to be used with managers as a basis for understanding and negotiating competitive strategy. A resource map may or may not require quantification (of the kind proposed by Warren 2002) or formal algebraic modelling and simulation (of the kind traditionally used in System Dynamics) depending on whether the issue facing the

management team is essentially interpretist (reconciling conflicting views about strategy) or functionalist (seeking insight into the likely outcome of an agreed strategy), or some combination of the two.

A RESOURCE MAPPING EXERCISE

As a practical illustration of our approach we present a resource mapping exercise based on the UK commercial broadcasting industry. To construct our maps we used Chief Executive Officer's (CEO) comments made in 1998-2000 annual statements of four leading firms in the industry (Capital Radio plc, Scottish Radio Holdings plc, GWR plc and Emap plc). We first analysed the statements ourselves in much the same way we would interpret comments of managers in a live resource mapping exercise. Then as an independent cross-check (described in more detail later) we asked mature MBA students with knowledge of core strategy concepts to read the same annual statements and to pick-out strategically relevant resources of the rival firms. From this analysis we were able to identify distinctive resource building strategies and tie them to cognitive asymmetries in the rivals' stated approach to strategy. Obviously there are methodological limits to this limited sample of firms and our use of annual statements as a surrogate for interviews with actual managers in those firms. We first address these limitations before describing in more detail our method and results.

We justify our focus on only four firms because previous published studies of cognition in firm strategy have employed limited samples in order to observe specific differences between individual cases (Jenkins and Johnson, 1997). Moreover in this particular industry the four firms are the dominant players with approximately 70% market share of commercial radio broadcasting in the UK, so the sample is representative.

We considered the criticism found in some academic cognition literature (for a review see Fiol, 1995) about whether texts excerpted from annual statements constitute valid measures of top managers' cognition. One problem with comments in annual statements or letters to shareholders is that neither the author, nor the author's intent, are known. This identity problem raises two interrelated questions. First, was the comment written by a member of the top management team or by a public relations specialist communicating on behalf of the top management team? Second, do comments in the public domain accurately reflect the cognition of the top management team? Abrahamson and Hambrick (1997) investigated these two questions, and they found anecdotal evidence suggesting that public comments reflect some form of consensus among various managers in the upper echelons of organization, as they often prepared the comments together. Moreover, some studies provided evidence that annual reports constitute valid measures of top managers' cognition, when it comes to causal attributions (Fiol, 1995; Huff and Schwenk, 1990). However, positive and negative evaluations are more likely to reflect 'impression management' than non-evaluative statements (causal attributions) (Fiol, 1995).

Note that in this exercise we were not seeking an overall evaluation (good or bad) by top managers of the strategy. Rather we were seeking the list of resources that the top management mentioned as responsible for the competitive performance of their firms. In other words, we focused on causal attributions of firm performance in terms of resources. Therefore, for the various reasons mentioned above, we have confidence in the information gleaned from annual reports for our purpose of demonstrating resource mapping.

The Three Step Process Followed

- First, we reviewed in detail the annual statements of the companies to identify factors and resources suggested by top management to be responsible for the performance of their

firms. We separated factors from resources to identify those concepts that might be difficult to represent as asset stocks, such as operational processes or exogenous variables. An example of analysed text is quoted below. Here resources are shown in bold, their effect on the development of other resources in italics, and finally references to firm performance are underlined.

*"*Classic fM had broken through the ***5 million audience*** barrier. *This was a great achievement for our* ***programming team*** at Classic fM. *Much of the audience increase can be attributed to a new schedule, which offers many more points of access for new listeners. Often the new programmes are also* <u>*revenue opportunities*</u>. As the range of radio stations proliferates*, it is increasingly important to differentiate our output from that of our competitors, and we concentrate on the proven success factors of well-researched music, relevant local news output, intelligent presentation."* (GWR Annual Statement 1998)

This quotation mentions two main resources: audience and programming team. The effect of the programming team on audience is to provide new and good quality programmes that differentiate Classic fM from rivals and attract listeners. A large audience then generates revenue opportunities for Classic fM.

- Second, thirty-three MBA students were randomly assigned the annual statements of one of the four companies to read and analyse. The exercise was part of their first assignment in a strategic modelling and simulation course. They were asked to identify the factors and resources most responsible for competitive advantage. All the MBAs had prior business experience and they had already taken at least one course in strategy. While the factors responsible for competitive advantage were intended to be different than resources themselves, the definition of resources provided to students in the exercise was ambiguous enough to generate overlaps between the two categories. We employed open-ended responses to observe not only the level of agreement among students about the resources they identified (reflecting their direction of attention) but also the similarities and

repetition of their descriptions of resources and factors (reflecting the intensity of their attention).

- We obtained nine responses for Capital Radio plc, four for Scottish Radio Holdings plc, eleven for GWR plc and six for Emap plc. Three responses were invalid because the authors mistakenly analysed briefing materials about the UK commercial broadcasting industry as a whole (provided as background reading to all students) instead of analysing the annual statement of the assigned company. We compared the responses for each company with our own list of resources from step one to observe the level of agreement reached. We paid special attention to the resources/factors found in common by students because they signal students' direction of attention (which we called 'Percent of Agreement' in the table of results for each company). We also noted the frequency of mention of similar resource/factors because repetition signals the intensity of students' attention (which we defined as 'Level of Importance' in the tables). The degree to which two or more students describe similar resources, or do so with the same frequency, indicates the homogeneity of students' attention patterns (Abrahamson and Hambrick, 1997).

  For example, we grouped the following resources/factors suggested by the students under the label 'programme division staff' in GWR plc:

  1. Recognised presenters including Dave Lee Travis and Simon Bates; 2. Skills in programme development; 3. Localized, quality programming that creates a bond with listeners; 4. Programme division; 5. Ability to research music, 6. Programmes; 7. Programme teams; 8. Best radio programs; and 9. Localized, customized, and quality programming

- Finally, once we consolidated the list of resources/factors perceived to be source of the competitive advantage of each company, we mapped them using system dynamics stock

and flow symbols. We then added causal relationships derived from CEO comments (recorded in step 1) to arrive at a resource map. (Note: the links between resources do not represent specific policies responsible for resource building of the kind often modelled in system dynamics (see for example Sterman 2000 chapter 13, Morecroft 2004, Forrester 1992). There was not enough information in CEO comments to reliably deduce operating policies. Instead we show simpler causal links that compress presumed underlying policies or decision processes. However, if we were conducting a resource mapping exercise face to face with management teams from commercial broadcasters we would endeavour to capture both policies and operating constraints.

Resource Maps

The management of the four leading commercial radio stations in the UK perceive their sources of competitive advantage differently. On the one hand, Emap plc and Scottish Radio Holdings (SRH) plc see the radio business as part of a broad multimedia strategy, but they each have different market orientations. Emap plc's assets such as magazines, radios and TV channels are oriented to pop music listeners. SRH's radio and newspapers are oriented to the general informational requirements of Scottish communities.

On the other hand, GWR plc and Capital Radio plc management perceive commercial radio broadcasting as their core competence, but they don't share the same strategies for generating revenues. While GWR plc management leverages the 'Classic fm' brand to classic music listeners located not only in UK but around the world, Capital Radio plc management leverages its well-known pop music brand mostly in the London area, offering not only radio programmes but also selling other complementary products and services such as music concerts, records and online music to pop music listeners.

GWR Group plc.

The list of resources and factors identified by students and perceived to be the source of competitive advantage of GWR plc is presented in table 1. There are six main concepts (resources and factors) showing a high percentage of agreement among students and appreciable level of importance (based on frequency of mention).

INSERT TABLE 1 HERE

We used this list to map out the resources and connect them as they might be visualised by GWR managers. The result is shown in figure 2. Although the map is synthesised from annual statements it nevertheless gives an idea of the interrelated resource building activities believed by GWR management to underpin their competitive strategy. A familiarity with the syntax of resource maps enables us to interpret how the firm is likely to perform over time – an interpretation that broadly parallels the intuitive reasoning GWR managers would use to explain the operation of their strategy. Basically the number of radio stations and the quality of the programming staff (which increases Classic fm's reputation as a good listening option) help to attract more radio listeners to GWR radio stations (arrow 1). A bigger audience enables the sales team to sell national advertisers more airtime (audience size is audited by an independent organisation –RAJAR- to provide advertisers with unbiased information about the performance of each radio station) thereby increasing the productivity of the sales team and the amount of advertising revenues (arrow 2). Extra revenues can be used to buy more radio stations in the UK or abroad (arrow 3) as well as to hire more programming staff. At the same time, GWR management recognise the need to control operating costs. They plan to achieve this control through 'Integration of the Systems in the Group' an activity connected to operating costs, which is shown as an outflow from 'Cash Available'.

The resource map helps to visualise the firm's intended competitive strategy in terms of building and configuring a unique set of broadcasting resources and assets difficult for rivals to copy. Moreover the resource map provides a basis to explain how the strategy will play out over time, a kind of dynamic hypothesis that could if necessary be checked-out more thoroughly with quantification, modelling and simulation.

INSERT FIGURE 2 HERE

Capital Radio plc.

The investigation of Capital Radio management's comments suggested the set of factors and resources presented in table 2. All responses achieved a high level of agreement because the annual statements provided a particularly clear picture of Capital fm's core business and its sources of competitive advantage. Like GWR plc, the fact that Capital fm's core broadcasting business is well-defined helped students to achieve a high level of consensus on the set of resources responsible for firm performance.

INSERT TABLE 2 HERE

The main resources identified were: radio stations, listeners, sales team, 'Capital *f*M' brand, radio presenters/programming staff, and the portfolio of assets and products under the 'Capital *f*M' brand. The resulting resource map is presented in figure 3. The number of London based radio stations and a highly recognised team of presenters located in the best time slots, such as breakfast time, increase the reputation and the attractiveness of the radio as a good listening option, which generates growth in the audience (arrow 1). Capital management also believe that marketing actions, for example concert events such as 'Party in

the Park' (arrow 2), help to improve the visibility of Capital Radio as a brand. Higher audience (shown as breakfast and youth listeners) helps the sales team to sell more expensive airtime to advertisers increasing the amount of sales per salesman (arrow 3) and Capital advertising revenues. The 'Capital *f*M' brand and its reputation as a pop music entertainment group is exploited through a portfolio of related assets such as restaurants, on-line music sales and a record label (arrow 4).

INSERT FIGURE 3 HERE

Emap plc.

The set of resources judged to be responsible for Emap plc's performance is displayed in table 3. In this case our step 1 analysis and students' step 2 responses did not achieve as high a degree of consensus on the main factors/resources as in the GWR or Capital cases. Interestingly the highest degree of agreement was achieved on intangible concepts, such as innovation and market oriented organisational structure, rather than more tangible resources. In addition, the level of importance was low implying a high diversity of concepts and lack of agreement among students about the sources of competitive advantage. Moreover only one student suggested as a key resource 'radio stations' (this result is interesting since we are describing the annual statement of one of the leaders in pop-music radio with stations like Magic FM, Kiss FM or Melody FM). The lack of a clear core business might have affected students' responses because Emap is a multi-media business organised in customer market segments (pop-music listeners and magazine readers) rather than in media assets like radio or magazines.

INSERT TABLE 3 HERE

Emap plc's resource map in figure 4 contains six key resources: radio stations, magazines and a record label (all oriented and recognized as pop-music brands), multimedia/content synergies, sales team, and young listeners (15-44 years). We associated the concept 'management skills to grow undervalued assets' with the effective control of operating expenses – an outflow from the corporate cash resource. Two concepts suggested in students' responses (innovation and global strategy - see table 3) are not included in the resource map because they do not represent resources or actions aimed at controlling flows but instead are descriptions of preferences for certain types of resources. For example a preference for buying international assets rather than local assets can be interpreted as part of a 'global strategy'. The process of resource building implied by figure 4 (how Emap's strategy will play out over time) can be interpreted as follows. Emap multimedia group has a portfolio of products such as magazines, radio stations and a record label aimed at a young market. A portfolio of media products has two synergistic consequences: one is to increase the availability of media content for each product (arrow 1); and the second consequence is to attract radio listeners to buy its magazines and magazine readers to listen its radio stations (arrows 2 and 3). Higher radio audience and magazine readership help the sales team to offer better advertising options to advertisers increasing the amount of sales per salesman and the level of revenues (arrow 4), which can then be used to buy more radio stations or magazines.

INSERT FIGURE 4 HERE

Scottish Radio Holdings plc (SRH)

SRH management comments in the annual statements suggest the set of factors and resources shown in table 4 to be responsible for firm performance. Most of the students' responses coincided with our step 1 analysis. Since Emap and SRH are similar companies (they are both multimedia groups), it is interesting to observe the differences in the level of agreement and importance obtained for SRH and Emap (see table 3 for Emap's resources). There is much better agreement for SRH. There are a number of reasons for this difference. First is the narrower scope of SRH plc that serves a defined geographic region (North of England, Scotland and Northern Ireland) with a strong focus on radio and newspapers and an organisation structure based on these two media types. Emap's scope is broader and can be described as a global portfolio of media assets, with special emphasis on magazines, aimed at a specific youthful market segment. Second, Emap reorganised its business structure (from media type to customer facing) during our analysis while SRH maintained a stable business structure over the three annual statements.

INSERT TABLE 4 HERE

The resource map of SRH plc in figure 5 has five main resources: audience, radio stations, newspapers, sales team, and synergies derived from content sharing among different media assets. The implied process of resource building is as follows. As radio stations and local newspapers share news, they increase their reputation and attractiveness as a good option for local information, which helps them to sustain radio audiences and newspaper readers (arrows 1 and 2). Large radio audiences and high newspaper readership help the sales team to sell airtime to local advertisers (arrow 4). SRH management also suggest that research

activities are necessary to sustain the attractiveness of radio programming because radio listeners change their preferences about the types of programmes they will listen to (arrow 3).

INSERT FIGURE 5 HERE

Review of Reported Performance of the Rival Broadcasters

Finally, to complete our analysis, we present in table 5 a set of performance indicators covering the period 1999 to 2002 derived from the four firms' financial statements and from the organisation responsible for auditing radio listening (RAJAR http:www.rajar.co.uk/QuarterlySummary/ accessed 4 October 2003). The table shows heterogeneous performances and important differences among the four firms in our sample. For example, those firms (Capital and GWR) whose core business is radio broadcasting obtain higher revenues than multimedia firms. The extra revenues appear to come from expanding the number of stations. But in 2001 and 2002 revenue growth slowed or even reversed suggesting fewer good opportunities to expand the portfolio of radio stations as the industry consolidated with fewer players. On the other hand when we observe the average hours listened per listener, the opposite picture emerges. Both multimedia companies (Emap plc and SRH plc) exhibit a higher number of hours per listener than their more focussed rivals, suggesting synergies among a portfolio of media assets.

INSERT TABLE 5 HERE

DISCUSSION

In this paper, we suggest that managerial decision-making to guide firm strategy involves two distinct components: first the creative conceptualisation of strategically relevant resources and then the implementation of operating policies to build those resources. The interaction between competing visions and idiosyncratic operating policies leads to complexity and variety in firm performance. In practice industry leaders conceive different mental models of the 'best strategy' to pursue because they face unstructured competitive and strategic situations and interpret the ambiguities differently. They have in mind different resource configurations (an interpretist view of strategy formation). Whatever resource configurations they eventually agree based on these alternative visions, the resulting firms they build perform differently in reality (a functionalist view of strategy execution). Competitive advantage can therefore be said to arise in part from managerial cognitive asymmetries. If so then the analysis of differential firm performance (a topic of central importance to strategy academics and practitioners alike) should benefit from problem structuring and modelling methods. Here we propose resource mapping as a novel and useful problem structuring method that combines ideas from system dynamics with the resource based view of the firm.

To illustrate our approach we devised a resource mapping exercise using publicly available information on four UK commercial radio broadcasters. First we examined Chief Executives' comments in successive annual statements and identified the resources and factors most important for each firm's competitive positioning. Then we asked MBA students to read the same annual statements and to independently identify the most important resources. Next we compared the students' lists of resources with our own and with each other. In most cases the level of agreement was greater than 60% suggesting that people with business experience can reliably recognise a resource-based strategy without themselves being expert modellers. Using the lists and related material we then constructed resource maps to represent visually the

connections between the resources and the implied resource building strategies of the rival firms. Finally, we interpreted the maps to illustrate the potential dynamic performance of the firms stemming from their strategies.

RESOURCE MAPS AS A PROBLEM STRUCTURING METHOD AND THEIR RELATIONSHIP WITH SYSTEM DYNAMICS

We believe resource maps, as part of a resource conceptualisation exercise, can help decision makers responsible for strategy to clarify and negotiate their theories-in-use. In that sense, resource maps can contribute to procedural rationality in strategic decision-making, consistent with Pidd's (2004) view of what OR/MS can bring to strategy.

For example, when working with managers in a single company, we can use resource maps to elicit their different interpretations of firm strategy and expected performance. Even within a single broadcaster like Capital radio it is possible that some members of the management team may have in mind new and radical strategic initiatives that challenge the status quo (such as the launch of a magazine or record label to make Capital more like its rival Emap). A resource mapping exercise would tease out these alternative views and the resulting diagrams may, if handled sensitively, defuse potential conflict arising from the need to prioritise options. However, Mingers and Rosenhead (2002) p.15 table 1.4 suggest that the technical requirements for appropriate problem structuring methods should include not only diagrams but also explorations of the solution space, discrete options, possibilities, and scenarios.

For resource maps exploration of the solution space comes from using the diagrams to interpret the dynamics of resource building as we have shown for the commercial radio broadcasters. However we believe the scope for meaningful exploration of the solution space

and options is further expanded by translating the maps into system dynamics models. Simulations can then help managers discover hidden pitfalls in strategy by allowing them to rehearse resource building (a task which is dynamically complex due to interdependencies, time delays and non-linearities). Our point is that cognitive flaws in strategy making arise from faulty expectations people form about the dynamics of resource building and it is just as important an activity for making successful strategy to uncover these flaws as it is to air differences of opinion about which particular resources to build. For example, it is precisely during organisational transformation or (as we observed in the Emap case) when the core business is not clear in top management minds that resource mapping alone is most useful for sharpening people's alternative views of the intended business. Once there is agreement (or at least accommodation) in support of one or other view, then full blown system dynamics modelling, as a complement to resource maps, can help to explore the solution space by rehearsing the preferred resource building strategy through simulation. In this case, system dynamics models are used as 'transitional objects' to facilitate dialog and exploration of future performance among the top management team (Morecroft, 2004).

In these situations, we use system dynamics to quantify relationships and to simulate possible futures within the context of an agreed resource-based strategy. While 'resource maps' based on stock and flow diagrams are visual aids to comprehend managers' conceptualisation of a strategy, a system dynamics model directs management attention towards the performance of the firm over time that results from actually building and deploying the resources through policies for resource (asset stock) management.

In conclusion we note that resource mapping opens up the front-end of system dynamics modelling, offering scope for negotiation and dialogue about the purpose of strategy similar to other problem structuring methods. Causal loop diagrams and system archetypes (Wolstenholme, 2003) perform much the same function, but resource maps are better suited to

competitive strategy and firm performance because they explicitly depict asset stock accumulations and are compatible with ideas about competitive advantage from the strategy field. Moreover resource maps, by starting from stocks and flows, lead naturally to a system dynamics simulator and its benefits for exploring solution spaces, options and scenarios. Nevertheless we recognise that resource maps and system dynamics are not a panacea for problem structuring in the strategy domain. Cognitive mapping and SODA offer different possibilities for negotiation and conflict resolution among the stakeholders of a firm's strategy. Other approaches such as robustness analysis are more appropriate for discrete strategic choices like a one-off decision to diversify or not. Resource mapping and system dynamics are best suited to continuous processes related to medium to long-term resource building strategies in which the waxing and waning of asset stock accumulations over time determine strategic success (Lane, 2000).

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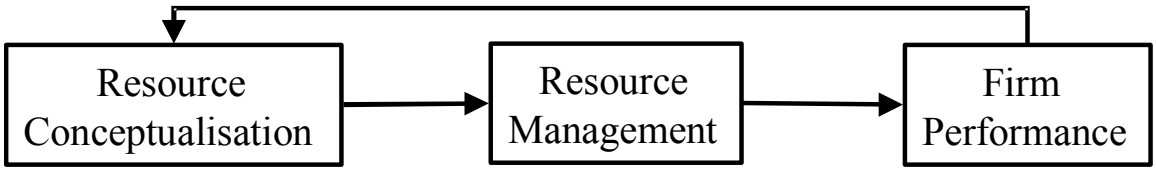

Figure 1 The relationship between firm performance and firm resources incorporating managerial cognition

Concepts	Percent of agreement *	Level of importance **
Radio Stations local and overseas	91%	17%
Classic fm brand (reputation)	73%	12%
Sales team	73%	9%
Programming Staff	64%	17%
Integration of systems and operational process (1)	64%	12%
Listeners	36%	9%

* percent of agreement between students.
** percent of factors and resources identified by students related to the concept.
(1) Integration of systems and operational process is not a resource but a specific action aimed to reduce the outflows of one resource (cash)

Table 1 Factors and resources underpinning competitive positioning and performance of GWR Group plc (identified by MBA students from their reading of GWR annual statements)

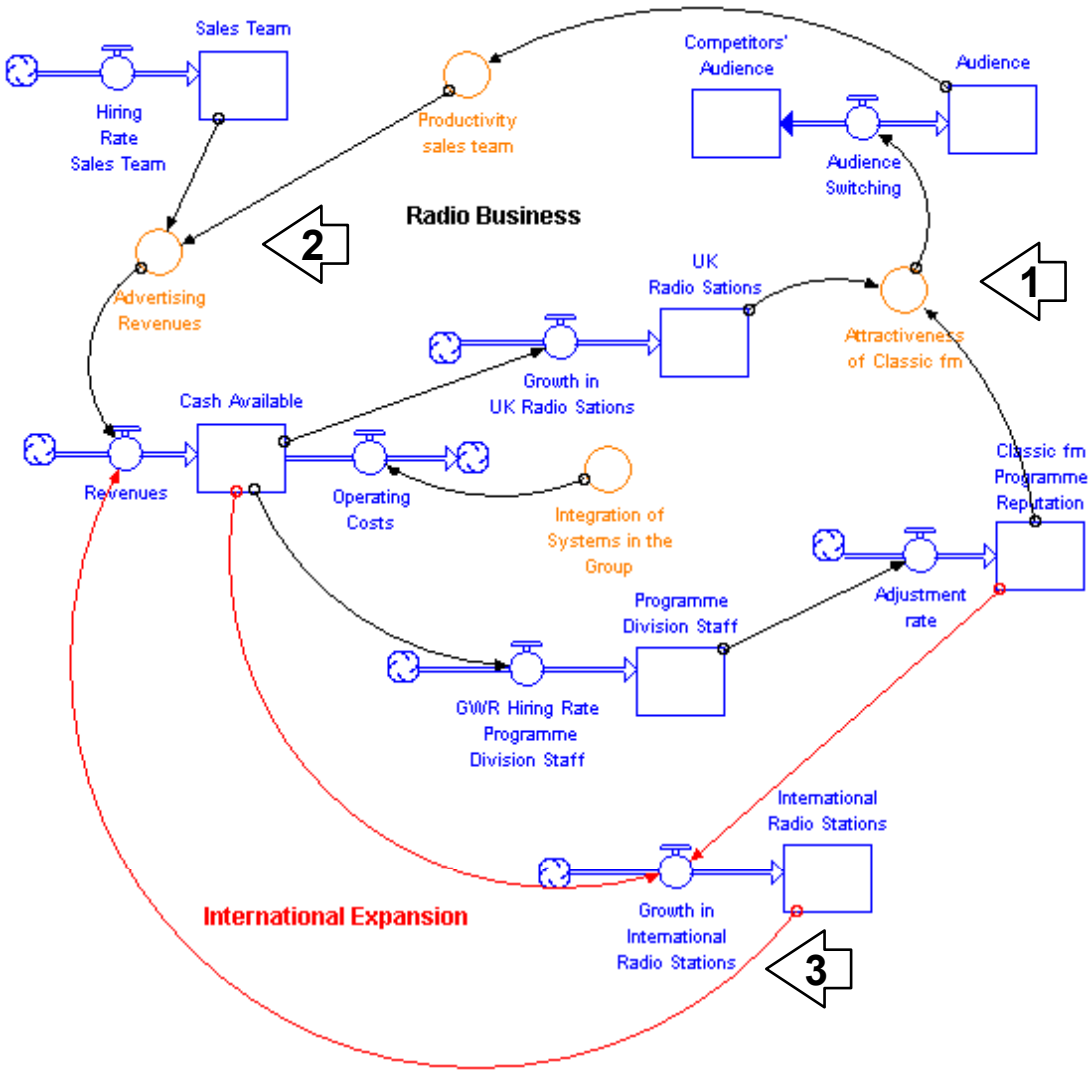

Figure 2 A resource map of GWR Group plc.

Concepts	Percent of agreement *	Level of importance **
Radio stations licenses (analogue and digital)	100%	28%
Sales team(1)	100%	20%
Capital fM brand and special events directed to community(2)	100%	14%
Breakfast and Young listeners	67%	11%
Assets related to music sales (record label and on-line music sales) and restaurant chain (synergies)	67%	9%
Reputation for quality programming/Highly recognized radio presenters	56%	7%
Portfolio of strong branded products (marketing skills)(3)	44%	7%

* percent of agreement between students.
** percent of factors and resources identified by students related to the concept.
(1) This concept was not included in our original list but it was included due to the high level of agreement among the students' responses.
(2) 'Special events directed to the community' is not a resource but a specific action aimed to improve one resource (brand recognition).
(3) Portfolio of strong branded products is a result of marketing skills to use the brand in different business. Portfolio of branded products can also be shown as a set of assets such as 'Assets related to music sales –record label-' and 'Restaurant chain'.

Table 2 Factors and resources underpinning competitive positioning and performance of Capital Radio plc (identified by MBA students from their reading of Capital Radio annual statements)

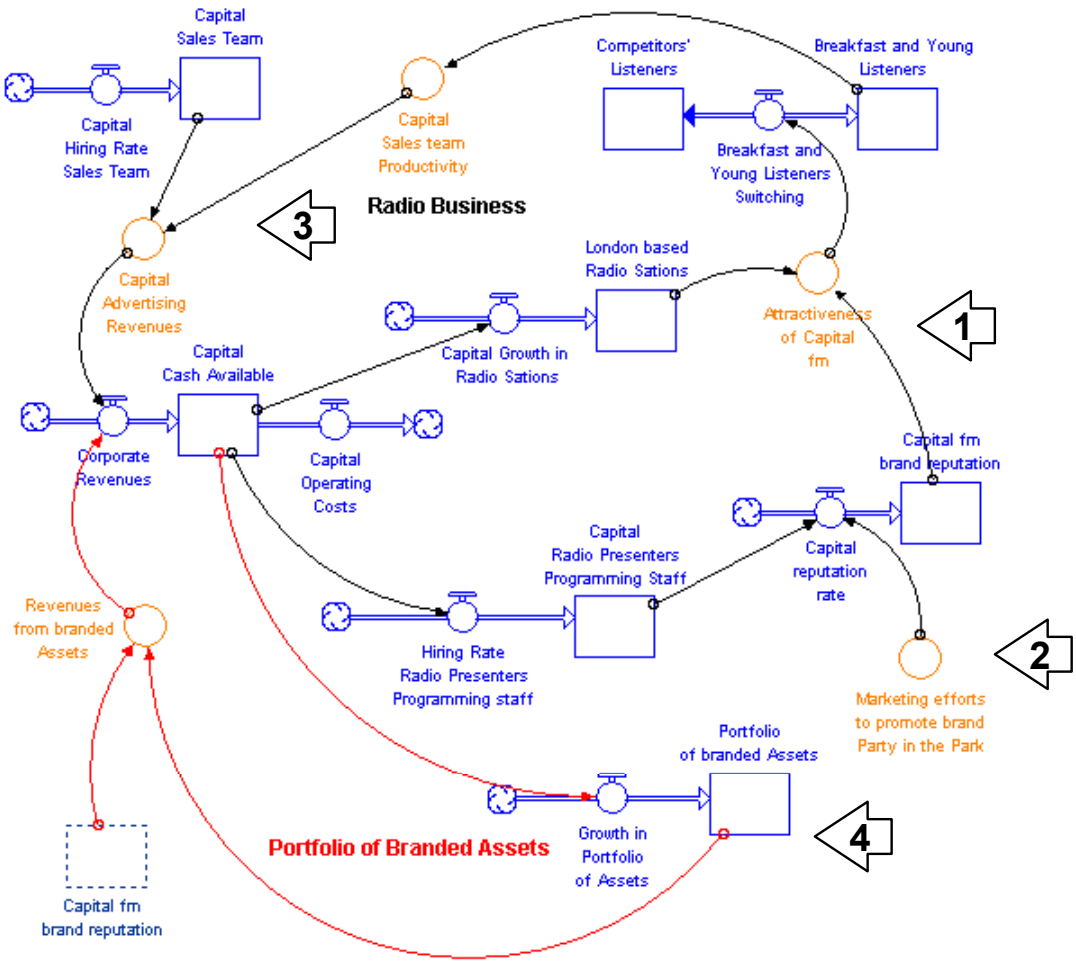

Figure 3 A resource map of Capital Radio plc.

Concepts	Percent of agreement *	Level of importance **
Acquisition of asset undervalued (1)	100%	19%
Organisational structure (Market oriented)	83%	15%
Innovation (2)	67%	7%
Pop oriented brands	50%	8%
Sales team	50%	7%
Multimedia structure (Content synergies)	50%	5%
International/Global strategy (2)	50%	3%
Young Listeners	33%	3%
Magazines and Record Label	33%	3%

* percent of agreement between students.
** percent of factors and resources identified by students related to the concept.
(1) Acquisition of asset undervalued is not a resource but a specific skill of the management team aimed to reduce the outflows of one resource (cash).
(2) Competitive factors mentioned by students but not included in our original list.

Table 3 Factors and resources underpinning competitive positioning and performance of Emap plc (identified by MBA students from their reading of Emap annual statements)

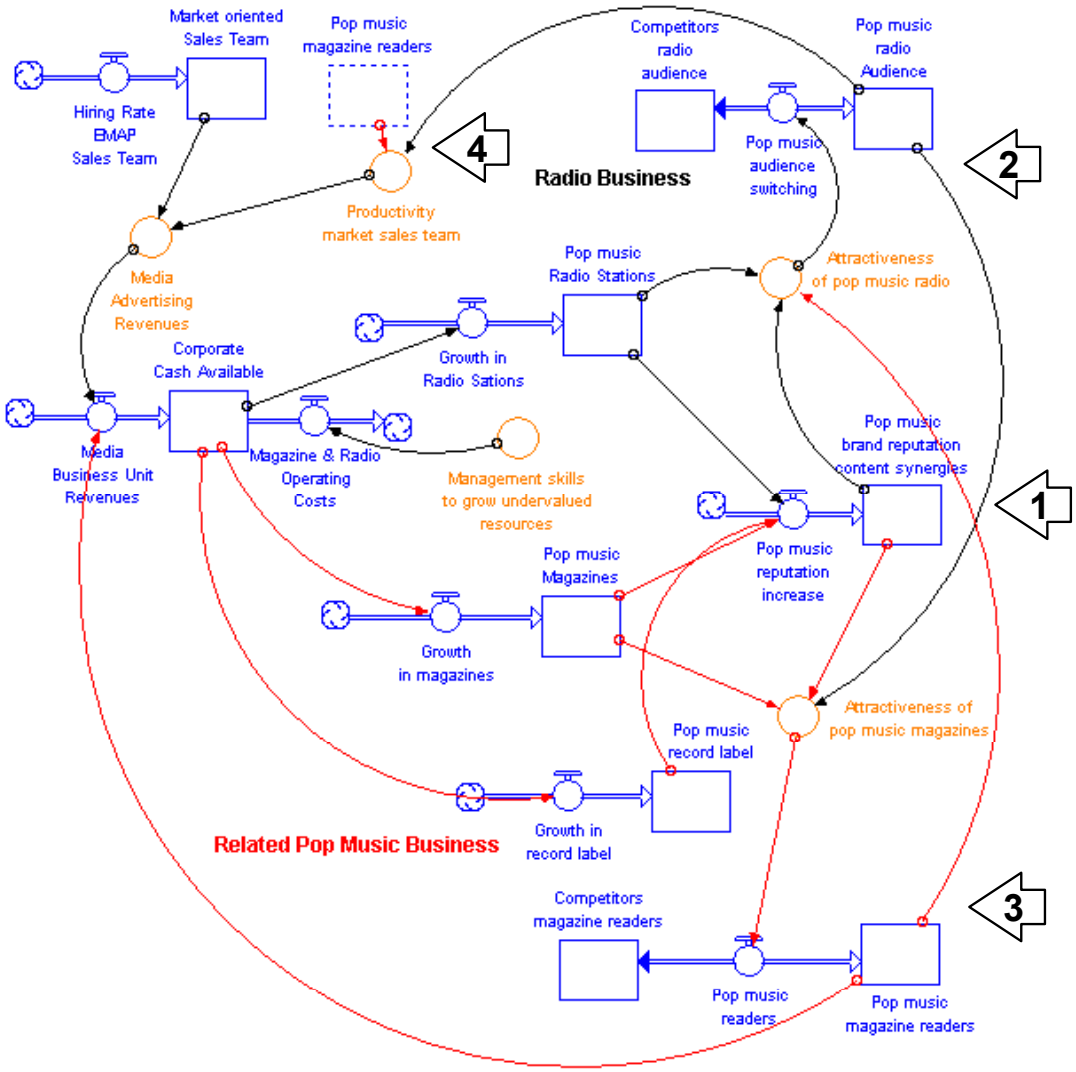

Figure 4 A resource map of Emap plc.

Concepts	Percent of agreement *	Level of importance **
Research and marketing activities (1)	100%	23%
Regional multimedia structure (Content synergies)	100%	17%
Local listeners	100%	15%
Digital radio stations	60%	6%
Sales team	50%	4%
Analogue radio stations	40%	4%
Promotion of radio industry (2)	20%	2%

* percent of agreement between students.
** percent of factors and resources identified by students related to the concept.
(1) Research and marketing is not a resource but a specific action aimed to improve one resource (brand reputation through better programming).
(2) Promotion of radio industry is a factor considered to be important on the development of SRH as multimedia group.

Table 4 Factors and resources underpinning competitive positioning and performance of SRH plc (identified by MBA students from their reading of SRH annual statements)

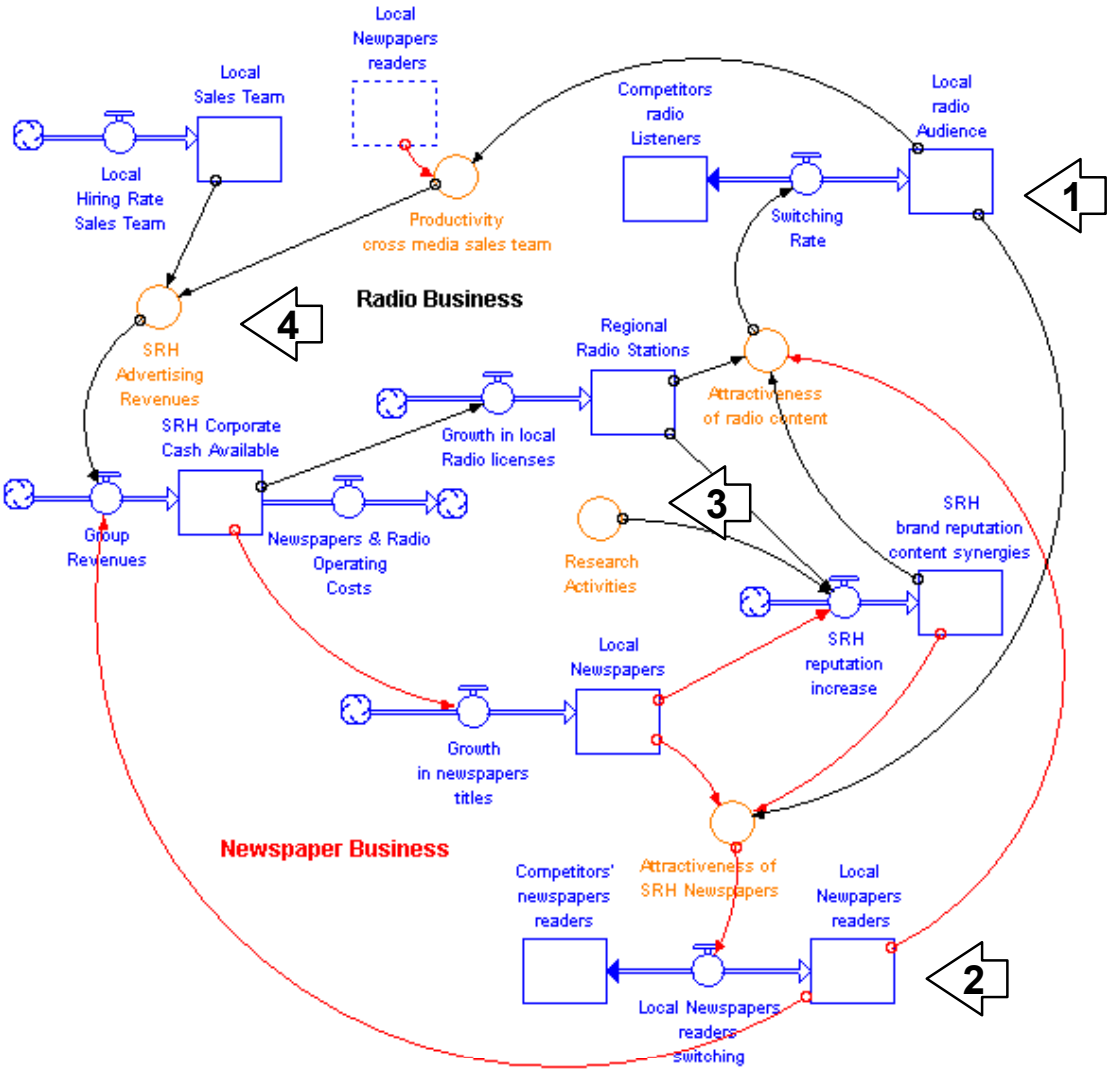

Figure 5 A resource map of SRH plc

	GWR plc Group						
	Radio Listening* '000 listeners		Total Radio Listening** 000 hours listened	Total Radio Listening*** hours per listener	Radio Revenue^ (2) £m	Number of Stations^^	Revenue per Station £m/station
	Classic fm (1)	Rest of Group	Total Group	Total Group			
1999	6004	4100	91205	9.03	84	34	2.5
2000	6041	5490	114252	9.91	102	53	1.9
2001	6698	5378	111645	9.25	120	54	2.2
2002	6657	5331	110168	9.19	121	50	2.4

	Capital Radio plc Group						
	Radio Listening* '000 listeners		Radio Listening** 000 hours listened	Radio Listening*** hours per listener	Radio Revenue^ £m	Number of Stations^^	Revenue per Station £m/station
	Capital fm (london)	Rest of Group	Total Group	Total Group			
1999	3017	3384	69813	10.91	105	16	6.6
2000	2852	5039	83145	10.54	124	21	5.9
2001	2951	5192	80607	9.90	122	21	5.8
2002	2460	5352	74013	9.47	119	21	5.7

	EMAP plc Group						
	Radio Listening* '000 listeners		Radio Listening** 000 hours listened	Radio Listening*** hours per listener	Radio Revenue^ (3) £m	Number of Stations^^	Revenue per Station £m/station
	Magic & Kiss fm	Rest of Group	Total Group	Total Group			
1999	2456	4179	72078	10.86	78	26	3.0
2000	2503	4153	68213	10.25	84	26	3.2
2001	2677	4028	69473	10.36	83	26	3.2
2002	2620	3978	62825	9.52	83	26	3.2

	Scottish Radio Holdings plc (SRH)						
	Radio Listening* '000 listeners		Radio Listening** 000 hours listened	Radio Listening*** hours per listener	Radio Revenue^ £m	Number of Stations^^	Revenue per Station £m/station
		Group (4)	Total Group	Total Group			
1999					33		#DIV/0!
2000					35		#DIV/0!
2001					34		#DIV/0!
2002		3010	35863	11.91	41	15	2.8

* Weekly reach - '000 listeners who listen to a station for at least 15 minutes in the course of week - Quarterly Summary at December - Source RAJAR
** Total hours of listening in '000s weekly - Quarterly Summary of Radio Listening at December - Source RAJAR / Total hours in UK is 500,000,000
*** Average number of hours per listener weekly - Quarterly Summary of Radio Listening at December - Source RAJAR
^ Annual Revenues - Source Annual Statements from each Company
^^ Number of Stations in the UK that made the total radio listening hours and radio listeners - Source RAJAR
(1) National figures
(2) Only UK radio revenues are included in this figures.
(3) 2001-2 Revenues are estimated since EMAP reorganised its business divisions and the revenue from radio was added to magazines and TV revenues
(4) The numbers of listeners corresponds to 2002, which is the only data available from Rajar

Table 5 Performance indicators of the four leading firms in UK Commercial Radio Broadcasting (1999-2002)