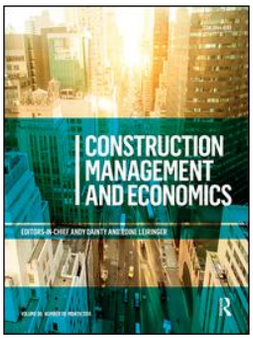

Routledge
Taylor & Francis Group

Construction Management and Economics

ISSN: 0144-6193 (Print) 1466-433X (Online) Journal homepage: https://www.tandfonline.com/loi/rcme20

How innovative is construction? Comparing aggregated data on construction innovation and other sectors – a case of apples and pears

Graham M. Winch

To cite this article: Graham M. Winch (2003) How innovative is construction? Comparing aggregated data on construction innovation and other sectors – a case of apples and pears, Construction Management and Economics, 21:6, 651-654, DOI: 10.1080/0144619032000113708

To link to this article: https://doi.org/10.1080/0144619032000113708

Construction Management and Economics (September 2003) **21**, 651–654

Spon Press
Taylor & Francis Group

NOTE

How innovative is construction? Comparing aggregated data on construction innovation and other sectors – a case of apples and pears

GRAHAM M. WINCH*

Manchester Centre for Civil and Construction Engineering, UMIST

Received 12 June 2002; accepted 28 May 2003

This research note addresses the widespread perception that construction performs badly compared to other industrial sectors. The evidence for this perception is usually based on comparative industrial performance data. However, due to technical problems with the Standard Industrial Classifications used, like is not compared with like in these analyses, to the systematic disadvantage of the construction industry's comparative performance. In an effort to improve the performance of the industry, the auto industry is often held up as an exemplar. However, when that industry is compared on a like-for-like basis with construction, it proves to have a poor record of performance.

Keywords: Standard Industrial Classification, construction industry performance, auto industry performance, construction innovation

Introduction

Construction is commonly characterized as a 'backward industry', and in particular, one that fails to innovate in comparison to other sectors. The benchmark sector that has served as the stick with which to beat construction is the motor vehicles industry. From the Bauhaus of the 1920s to the Egan Report (Construction Task Force, 1998) of the 1990s critics of the industry have admired the continuous flow and falling real costs of car production. In particular, housing – the 'industry God forgot' (cited in Lawrence and Dyer, 1983, p. 158) – has been attacked and critics have asked themselves 'where is the Henry Ford of future housing systems?' (Miles, 1996). This question rather ignores the fact that Foster Gunnison had already been acclaimed the 'Henry Ford of housing' in the 1940s, yet had failed dismally in his ambition to apply the production techniques of the motor vehicles industry to housing production (Hounshell, 1984).

*E-mail: g.winch@umist.ac.uk

The charge against construction is that from its heyday in the nineteenth century, when it was a quintessentially modern industry with its symbolic achievements of the Crystal Palace, the transcontinental railway, Haussmann's Paris, or the Suez Canal, construction failed to transform itself into a 20th century industry. While other sectors modernized through the introduction of interchangeable parts, then assembly lines, and then automation, construction retained its craft method of operation and fell further and further behind the rest of the manufacturing industry in terms of productivity, quality, and, hence, value for money. In a word, it did not *innovate*.

The aim of this short research note is twofold. The first is to challenge the widespread assumption that there is conclusive evidence of the poor performance of the construction industry *compared with* other industrial sectors, by presenting the analytic structure of the industrial classification system for performance data. The second is to challenge the appropriateness of using the motor vehicles industry as a role model for the construction industry on the basis of its apparent superior performance by presenting

Construction Management and Economics
ISSN 0144-6193 print/ISSN 1466-433X online © 2003 Taylor & Francis Ltd
http://www.tandf.co.uk/journals
DOI: 10.1080/0144619032000113708

data on its very poor performance in terms of customer satisfaction. However, before this is done, it will be appropriate to briefly present the conceptual framework which has inspired this paper.

A conceptual framework

There have, broadly, been two types of response to the criticisms of the performance of the construction industry :

- To accept them, and to strive for radical change in the way the industry operates. This was behind the industrialization movement of the 1950s and 1960s (see Russell, 1981), and the lean construction and rethinking construction agenda of the 1990s (e.g. Construction Task Force, 1998). Analysts responding in this way typically use the auto industry as an implicit or explicit model of effective and efficient organization.
- To argue that construction is not backward, but simply different (Ball, 1988), due to the role of land in the total purchase price of the constructed product, or the site-specificity of the assembly stages of the construction process. Nam and Tatum (1988) provide a thorough analysis of the specificities of construction with respect to innovation.

Both of these positions have merit. Therefore, our task is not to chose between them as thesis and antithesis, but to synthesize them in a broader analysis. For over 20 years, innovation research has been dominated by the model developed by Abernathy and Utterback – well summarized and developed in Utterback (1994). The central tenet of this model is that of the industry life-cycle from an early fluid phase when product enhancing innovation is the key, and where there is intensive competition between different design concepts, through a transitional phase which witnesses the emergence of a dominant design to a specific phase when competition is between a few large firms through performance improving (particularly cost reducing) innovations. While there has been much debate over the details of this model, and the differences, for instance, between assembled and non-assembled products, the basic life-cycle model is widely accepted, and can currently be seen at work with a vengeance in the market for Internet service providers. The perception that construction is 'stuck' at the early stage of this life-cycle is, arguably, the basis for the charge of 'backwardness'.

An implicit assumption of this model is that of the single firm – or population of competing firms – competing for the attentions of the customer through the market (Hobday, 1998). Recent research – particularly on the flight simulation industry (Miller *et al.*, 1995; Rosenkopf and Tushman, 1998) – has argued that there is a qualitatively different type of innovation process in what they characterize as the complex systems industries which manufacture complex product systems (CoPS). The organization of production in complex systems industries is characterized by its project orientation, the contribution of temporary coalitions of firms to production, the heavy involvement of the client in the process, and, most notably, the adamant refusal of the industry to move down the product life cycle. In other words, they fail to go through the transformation process where 'the ecology of competing firms changes from one characterized by many firms and many unique designs, to one of few firms with similar product designs' (Utterback, 1994, p. 24). It can now be confidently argued that construction is such a complex systems industry (Hobday, 1998; Winch, 1998), and that general comparisons with industries such as motor vehicless which *do* move through the product life-cycle are misplaced.

Apples and pears in cross-sectoral comparison[1]

However, none of these contributions have addressed the assumption that 'construction' *does* suffer from lower levels of innovation than other industries directly. The main source of data typically cited to support the argument that rates of innovation are low compared to other industrial sectors is data on, for instance, innovation measured as expenditure on research and development as a proportion of value added, or productivity measured as value-added per head. These data are commonly taken either from national accounts, or specifically targeted surveys structured using the same categories as national accounts – Manseau and Seaden (2000) provide an overview of such work, while the OECD's Oslo Manual (OECD, 1997) provides the methodological rationale. However, closer inspection of these data reveal that the standard industrial classifications (SIC) used as the basis for national accounts do not allow the comparison of like with like.

All industries supply bundles of goods and services to their customers or clients through distinctive value systems (Porter, 1985). The problem is that the bundling of "construction" goods and services used for the SIC is systematically different from that in all other sectors. If, at a simple level, we can think of any value system as consisting of sequentially arranged value chains of ***A*** *design*→***B*** *manufacture*→***C*** *distribute*→***D*** *maintain* in the manner shown in Figure 1, then this becomes clear. To take a typical comparator – the 'motor vehicles' industry, as defined in the SIC, only includes value chains A and B. Firms engaged in C and D are allocated to another

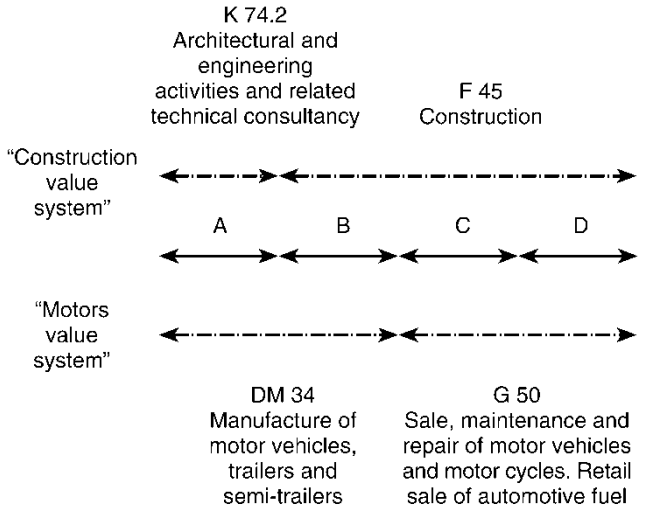

Figure 1 Comparing the value systems of 'construction' and 'motor vehicle'

sector. The SIC for 'construction', on the other hand, excludes A, but includes all firms engaged in B, C, and D. The SIC categories are taken from the United Nations' International SIC (revision 3) implemented in the UK via the European Commission's NACE (revision 1) as SIC 92 (www.statistics.gov.uk; ONS, 1996), which was slightly revised in 1997.

The effect of this places innovation measures in 'construction' in an unfavourable light in two ways. First, most product innovation in 'construction' is excluded from the analysis by statistical fiat. Product innovation is, in essence, a design activity, so this is largely the responsibility of A-sector firms, not B-sector firms. Architectural and engineering consulting firms which carry out most of the design work in 'construction' are allocated to a group within Other Business Services in SIC 74.2, not Construction (SIC 45), yet it is SIC 45 data that is used in the comparisons. Even on design-build contracts undertaken by construction contractors, the design work is usually sub-contracted to a consultancy, and, therefore, counts as SIC 74.2 activity, not SIC 45.

Second, distribution and maintenance are – uniquely – included within SIC 45 and typically account for over half of value added in that division, yet are not included in any division within manufacturing (section D) such as 34 for motor vehicles vehicles, except for 35 which includes ship repair. The 'motor vehicles' industry is unusual in having a separate SIC division for distribution, repair and maintenance. Most repair and maintenance is part of the retailing division 52. Repair and maintenance, by definition, require low levels of innovation, and have inherently low productivity due to their labour intensity. The essence of such activity is to reinstate the existing, not innovate, although there are some opportunities for process innovation. The conclusion of this analysis must be that comparisons of rates and levels of innovation in construction with other industries which do not compare the full value system from A to D for all sectors compared are inherently flawed. Any comparison of industry performance using data organized in SIC categories must either encompass the whole value system for each industry compared, or compare only the same parts of the value system. So far as I am aware, neither of these comparisons has been attempted for any country, yet construction is frequently coercively compared with manufacturing, and, in particular, motor vehicles vehicle manufacturing.

Is the 'motor vehicles' industry a good model for 'construction'?

We have argued that the performance of the construction industry is shown in an unfavourable light due to the structure of the international standards for SICs. The inverse is also true – the performance of other sectors is flattered by the exclusion of distribution, and repair and maintenance. In particular, from this value system perspective, it can be suggested that the 'motor vehicles' industry, at least in the UK, has a poor record of performance:

- Value chain D is dominated by small firms and one-person businesses, frequently undercapitalized and deploying poorly trained operatives. As a result, the car industry value system – a least in the UK – is rife with poor workmanship and overcharging costing consumers £170m per year. A survey of 77 garages found that 39% provided 'critically unsatisfactory service, some of it potentially dangerous to the customer', and 20 were subsequently prosecuted for their failings by Trading Standards Authorities (OFT, 2000). Even the larger firms which run chains of quick-fit repair centres often recommend 'expensive and unnecessary work', and provide customers with 'dirty and uncomfortable facilities' according to a Consumers' Association report of January 2001.
- There are also major problems with value chain C. The industry has a poor record on pricing due to the rigidities in the organization of distribution through the Selective and Exclusive Distribution System, permitted under the European Union's Block Exemption for the EU motor vehicles industry (Competition Commission, 2000);
- Best practice is restricted to a few large firms solely occupied with value chains A and B, with a long tail of poorly performing firms in value chains C and D giving the industry a poor reputation

from the point of view of the satisfaction of its customers.

Given these data, it is, perhaps, surprising the 'motor vehicles' industry is frequently cited as a model for 'construction'.

Concluding thoughts

This research note has argued that cross-sectoral comparisons of the performance of the construction industry – typically in terms of productivity trends or expenditure on R&D – are inherently flawed due to the international standards for the organization of Standard Industrial Classifications. There is, therefore, no firm evidence that the performance of the 'construction' sector is any worse (or any better) than that of any other sector such as 'motor vehicless' from SIC-based data, which accounts for most published analyses. The argument here is not for complacency – an important driver of construction industry reform programmes in many countries is client dissatisfaction which has its own compelling logic. Moreover, comparisons *between* national construction sectors using United Nations standards remain possible, even if problematic – see Edkins and Winch (1999) for a discussion. Like any industry 'construction' needs to increase the rate of innovation (Fairclough 2002; Gann 2000). However there is currently no reliable evidence that 'construction', when compared to other industries properly considered as value systems, has a lower (or higher) rate of innovation than its comparators. Just like the 'motor vehicles' industry, it has enormous room for improvement if it is to meet the growing expectations of clients efficiently and effectively.

References

Ball, M. (1988) *Rebuilding Construction: Economic Change in the British Construction Industry*, Routledge, London.

Competition Commission (2000) *New Cars: A Report on the Supply of New Motor vehicles Cars within the UK*, Competition Commission, London.

Construction Task Force (1998) *Rethinking Construction*, DETR, London.

Edkins, A.J. and Winch, G.M. (1999) *The Performance of the UK Construction Industry: An International Perspective*, Bartlett Research Paper **4**.

Fairclough, J. (2002) *Rethinking Construction Innovation and Research* DTI/DLTR, London.

Gann, D. (2000) *Building Innovation: Complex Constructs in a Changing World*, Thomas Telford, London.

Hobday, M. (1998) Product complexity, innovation and industrial organisation, *Research Policy* **26**, 689–710.

Hounshell, D.A. (1984) *From the American System to Mass Production 1800–1932*, Johns Hopkins University Press, Baltimore.

Lawrence, P.R. and Dyer, D. (1983) *Renewing American Industry*, Free Press, New York.

Manseau, A. and Seaden, G. (eds.) *Innovation in Construction: An International Review of Public Policies*, Spon, London.

Miles, J. (1996) *Where is the Henry Ford of Future Housing Systems*? Royal Academy of Engineering, London.

Miller, R, Hobday, M., Leroux-Demers, T. and Olleros, X. (1995) Innovation in complex systems industries: the case of flight simulation. *Industrial and Corporate Change* **4**, 363–400.

Nam, C.H. and Tatum, C.B. (1988) Major characteristics of constructed products and resulting limitations of construction technology. *Construction Management and Economics* **6**, 133–48.

Office for National Statistics (1996) *UK Standard Industrial Classification 1992: Methodological Guide*, ONS, Bristol.

Office of Fair Trading (2000) *Car Servicing and Repairs*, OFT, London.

Organization for Economic Cooperation and Development (1997) *The Measurement of Scientific and Technological Activities*, OECD, Paris.

Porter, M. (1985) *Competitive Advantage*, Free Press, New York.

Rosenkopf, L. and Tushman, M.L. (1998) The coevolution of community networks and technology: lessons from the flight simulation industry, *Industrial and Corporate Change* **7**, 311–46.

Russell, B. (1981) *Building Systems, Industrialisation and Architecture*, Wiley, London.

Utterback, J.M. (1994) *Mastering the Dynamics of Innovation*, Harvard Business School Press, Boston.

Winch, G.M. (1998) Zephyrs of creative destruction: understanding the management of innovation in construction. *Building Research and Information* **26**, 268–79.

Note

1. In this section onwards inverted commas are used to denote the value system definitions of 'constuction' and 'motor vehicles'.