

A COMPARISON OF AFRICAN PORT PERFORMANCE

By

V.F.VALENTINE

ABSTRACT

Stakeholders and port users alike are concerned with the concept of port performance despite the absence of a universally accepted formula for its measurement. Understanding performance is a concept fundamental to any business, whether it is the measuring of achievements against set goals and objectives or, against the competition. Ports are no exception and it is only by comparison with other ports that performance can be evaluated. There are many factors that have an effect upon the performance of a port; the location, infrastructure, superstructure and connectivity to other ports are but a few. Over the last twenty years much reorganisation has occurred within ports following the global adoption of privatisation policies by individual governments. Between 1990 and 1998 there were 112 port projects with private participation in 28 developing countries providing an investment totalling more than US\$9 billion (Sommer 1999). The value of world-wide privatisations in all industries for 1999 grew by 10% over the preceding year providing governments with US\$145 billion (Washington Times 2000). Numerous studies have been conducted on port efficiency, some made using the assessment of productivity based upon output per worker (DeMonie 1987), output per wharf (Frankel 1991) whilst others use production functions (Kim and Sachish 1986, DeNeufville and Tsunokawa 1981). Ports are, however, a complex business with many different sources of inputs and outputs that makes direct comparison among apparently homogeneous ports seem difficult. This paper will use a technique known as Data Envelopment Analysis (DEA) to calculate the relative efficiency of ports using size of the port as an input. Concentration will be placed upon container throughput given the current world trend for this form of cargo handling. Martinez-Budria et al (1999) and Tongzon (2001) conducted research using DEA on Spanish and Australian ports respectively. This paper (adopting a somewhat different approach from other authors) will focus on the region of Africa comparing performance of 15 ports in 10 countries.

INTRODUCTION

World seaborne trade boasted its fifteenth consecutive annual increase in absolute terms in 2000, reaching a record high of 5.88 billion tons, a rise of 3.6% from the previous year. However figures for 2001/2 are likely to be as low as 2%. The projected decline is mainly attributable to the impact of the economic downturn observed in the US and to a lesser extent in Europe (UNCTAD 2002). However UNCTAD's statistics show that the overall share of seaborne trade for developing countries declined slightly in 2000. These countries accounted for about half of goods loaded and 30.2% of goods unloaded, compared to 50.6% and 31.2% in 1999, respectively. Oil and other commodities constitute a large proportion of those loaded goods. For developing countries in Africa, the share of loaded seaborne goods fell to 6.3%, and unloaded goods down to 2.8% (UNCTAD 2002). World container port traffic continued to expand in 1998 at a rate of 6.7 per cent over 1997, reaching 165.0 million TEU's, of which 88.5 million TEU's (or 53.6 per cent, compared with 50.9 per cent in 1997) were handled at the ports of developing countries (UNCTAD 2001). For some major container ports such as Colombo and Algeciras transshipment traffic makes up 70-80% of their total throughput. It has been estimated that 26% of world port movements are transshipment (Cargo Systems 2000). This growth in transshipment cargo has in turn brought about an increase in port competition as ports never previously considered to be competitors now compete for the same business. Likewise, the emergence of global liner shipping companies have also meant that fewer ports of call are desired for the largest container vessels meaning that ports have to try harder to compete for business against fewer customers in a augmented market place. Within Africa there are large disparities in the volume of container traffic moved by each country. This is due to differences in

economic levels, population size, geographical position, quantity and type of goods traded, number and size of ports, etc. For example eight ports in Egypt and South Africa account for almost 52 per cent of the total traffic of the continent. The top 10 ports account for almost 67 per cent of the total container traffic. The total container traffic of all ports on the African continent was only 11.5 per cent higher than the traffic handled by the port of Rotterdam during 2000, and equivalent to 40 per cent of the traffic of the busiest container port in the world, Hong Kong, China (UNCTAD 2002). In 2000, African container throughput was over 7.2 million TEU compared to 6.4 million TEU the previous year and 5.6 million TEU in 1997. The percentage of cargo moved in containers in Africa was estimated at 53.0 per cent in 1999, versus the world rate of 57.4 per cent. However, there are large variations amongst countries, ranging from 86 to 28 per cent (Containerisation International Yearbook 2001). The low volume of containerised exports is explained by the fact that, with few exceptions, exports are mainly basic commodities (i.e. minor value added) and crude oil, and thus transported in bulk. For example in West Africa 73 per cent of its total seaborne trade was composed of crude oil and oil products versus 7 per cent for Southern Africa.

BACKGROUND

Trade to and from Africa is somewhat less than might be expected from such a large continent. The Africa continent is a vast geographical region with a population of about 750 million people in 54 countries. This represents about 13 per cent of the world's population. Although 15 countries are landlocked most countries have access to the continent's vast coastline of 30,490 kilometres. Though it is a huge landmass, its GDP is relatively low. 33 African countries are classified as least developed countries (annual income per capita less than \$300) of these 21 have sea access and 12 are landlocked. Despite being in a similar economic position to South East Asia some 30 years ago trade has not grown as significantly. In 1993 the GDP for the entire continent was equivalent to that of Sweden. Though trade has grown within the last 10 years Africa still remains one of the poorest regions in the world. Primary commodities dominate exports and three-quarters of the export cargo is oil from Algeria, Libya, Nigeria and Cameroon. Dry cargo exports are composed principally of iron ore (Mauritania), phosphate rock (Morocco), bauxite (Guinea) and various agricultural products. Africa is one of the major exporters of timber, fruits and crude oil. Africa is a continent that has tended to be regarded as one the main sources of raw material for Europe. Two of the most economically developed countries in Africa are South Africa and Nigeria who between them generate nearly two thirds of the aggregate GDP of the 47 Sub-Sahara nations (Drewry 1995). Richards Bay in South Africa is the world's largest bulk coal terminal exporting around 54 million tons of coal and minerals annually. There are about 90 ports in the Africa, that in 2002 handled 712 million tons of goods equivalent to 5.9 per cent of the world traffic (UNCTAD 2002). The developing countries boasted a moderate increase in their share of the world fleet, expanding from 153.6 million deadweight tons (dwt) in 1999 (19.2%) to 157.0 million dwt in 2000 (19.4%). African developing countries, by contrast, own 0.7% of world tonnage (3.8% of all developing country tonnage). Traditionally, private enterprise within the transport chain has been limited, even in the more developed countries. However, privatisation is beginning to take a hold and the government of South Africa is in a process of privatising port ownership after recently introducing corporatisation.

Privatisation is a concept rather than an actual definable process. The word came into being during the late 1960s and was later attributed to the UK government's reforms to ownership and operation of numerous companies managed by the state. Chapman

(1990) has accredited Drucker (1969) as the author of the word 'privatization', in its American spelling. The actual process of implementing privatisation is not however a new concept. Neither can it be said to have originated in the UK. It was rather a christening of an established process, a renaissance of an earlier idea on the ownership and management of a company. What can be said is that the extent to which the UK government pursued this course of action certainly attracted attention from other countries which no doubt contributed to the sudden global desire to privatise during the 1980s and 1990s. The value of world-wide privatisations in 1999 grew by 10% over the preceding year providing governments with US\$145 billion (Washington Times 2000). Some countries have rapidly progressed towards this goal of privatisation whilst others have been hindered by political, fiscal, labour or a general unwillingness to accept change. A comprehensive review of privatisation methods is given in Abdel-Fattah et al (1999).

Privatisation in developing countries is often the first phase in a process of industrial liberalisation and a move towards industrial progression. Viewed as this first step towards creating free trade it has therefore not surprisingly been a high priority for developing countries. It begins with the transfer of absolute control of industry away from the government to private partners with particular expertise. The reasons for this change are numerous but can be summarised as follows: improvements in efficiency through private sector management skills; enhancement of service quality through improved commercial responsiveness; reduction in the fiscal burden of loss-making state enterprises or the need for the future subsidy; a reduction in the fiscal demands on central and local government through access to private sector capital; and additional revenue streams (Port Development International 1999).

ORGANISATIONAL STRUCTURE

Other research carried out by the authors has looked at Organisational and ownership structures and compared them to efficiency. Roe (1999) in looking at the newly privatised subsidiaries of the state owned Polish Ocean Lines observed that there was a desire to avoid control from the parent company and to change the organisational structure soon after privatisation. Mintzberg (1979) looked at organisational structures and reached the conclusion that there are essentially five different types of organisational structure, simple, machine bureaucracy, professional bureaucracy, divisional and adhocracy. As far as ports are concerned only three of these seem to fit into the modern day port structure. First let us consider the options that do not fit. The adhocracy does not fit into the structure of any port because of its lack of rigidity. Suitable for software companies and film producers, its role within a port would likely lead to chaos. Ports require careful planning and development based upon what may be needed 10 or 20 years into the future. Without the rigidity of a formal structure each element in the chain would not know the whole picture, only the person at the top may see everything. Likewise the professional bureaucracy is not suitable in a port because of the routine and repetitive tasks that are commonplace within a port's day to day service. The professional bureaucracy is typical of industries that require highly professional people to perform routine tasks in an unsupervised manner such as solicitors and accountants. Whilst professional people are required in certain areas and qualified personnel needed to operate expensive and dangerous machinery, a professional bureaucracy would not be appropriate. This leaves us with the three remaining structures that are prevalent in the port industry, viz. simple structure, machine bureaucracy and divisional.

The simple structure is the most flexible, allowing separate divisions/departments reporting straight to the top decision-maker. As the name suggests it is usually the first

stage through which a company progresses in its evolution. This structure by its simplicity is therefore likely to be the most efficient.

The machine bureaucracy is characterised by its many departments reporting up a chain of command to a line manager before reporting to the top decision-maker. Because the decision making has to follow a long process before it reaches the top, decisions tend to be slower. These structures tend to be found in government owned enterprises and hence the inclusion of port bodies and corporatisation in this category.

The divisional structure occurs when companies operate within large areas. Each department has to report to a regional office that in turn reports to a select group of managers before information is passed to the top decision-maker. This structure can be best seen in the municipal ports of the UK and the port societies of Columbia. These divisional structures tend to operate where there are joint public/private enterprises or where conglomerates own the port.

OWNERSHIP STRUCTURE

Cass (1996) in his study of world port privatisation concluded that there were only really three types of port ownership, public, private or joint public/private. He points out that the most common type of port privatisation are (1) the sale of operating concessions, (2) joint public/private venture, (3) private orientated but port authority controlled operating subsidiaries, (4) the 'corporatisation' of government port agencies or (5) the dissolution of government owned cargo handling monopolies. The 'lock, stock and barrel' approach of Great Britain and New Zealand are the exceptions. The degree of public involvement is naturally dependent upon national ideology. Cass (1996) and Heikkila (1990) both state the examples of the United States where the municipal authority plays a major part in the operation of the port. Here ports compete against other ports along the coast for business. However, at the other end of the scale is Taiwan where the administration of the ports is centralised.

Boardman and Vinning (1989) found that different types of ownership structure, the state owned enterprises and mixed economies performed substantially worse than similar private companies. They concluded that there were performance differences between public and private companies in competitive environments and, that where there was a partial privatisation the performance was sometimes the worse. They cited that conflicting ideologies between the two different owners cause what they term 'cognitive dissonance'. However, Bos (1991) looked at what Tandon (1997) called "the survey of all the surveys" on the efficiency of public and private firms and came to the opinion that Boardman and Vinning (1989) had direct opposing views from a previous study by Borchering et al (1982). Tandon's (1997) explanation of these apparent conflicting views relies not upon the ownership structure but upon the market conditions in which they operate. Private firms are likely to be in a more competitive environment and thus more in tune with the need to be efficient than public enterprises that perhaps operate in a restrictive environment. He argues that in studies involving public and private firms in the same business, such as airlines, some private airlines are more profitable but on balance it is approximately equal. This research aims to see whether this is the case for ports.

Caves et al (1982) in looking at United States private railways and Canadian public railways concluded that the Canadian public firm was more efficient. Tandon (1997) states that the process of identifying which approach is more efficient depends upon

disentangling ownership from the effects of deregulation and competition. De Alessi (1980) states that not only are government firms less efficient but are also less successful in satisfying the consumer's needs. Everett and Robinson (1998) in their research into Australian port reform suggest that the "corporatization" of some ports has not resulted in the liberalisation and the near private performance that was anticipated. Frech (1980) in looking at the role of property rights within the firm suggests that if the ownership structure is attenuated this leads to lower firm wealth and more non-pecuniary benefits. Thus, privatisation, by shortening the ownership structure should have an opposing effect. Likewise the organisational structure should also play a significant role by suggesting that simple structures be inherently more efficient than the more complex machine bureaucracy and divisional structures.

Although this paper does not use organisational or ownership structures, it is hope that further research will be carried out expanding upon the data used in this paper.

TECHNIQUE FOR MEASURING EFFICIENCY

Data Envelopment Analysis [DEA] is an established statistical technique which measures the relative efficiencies of units where simple efficiency measures are difficult to obtain (Farrell 1957 and Charnes et al 1978). The main attraction of DEA is that it can deal with multiple inputs and outputs. The units in any DEA assessment are generally homogeneous and independent units performing the same function, and it is of most use where there are a large number of units providing an 'identical' service in relative isolation (Szczepura et al 1992). DEA was first developed as a way of measuring service units by Charnes et al (1979) and was based upon Farell's (1957) idea of linking the estimation of technical efficiency and production frontiers. The model has since been added to and developed over the years. Between 1978 and 1992 over 400 articles, books and dissertations were published on DEA (Charnes et al 1995). Warwick Business School has pioneered the research and is regarded as one of the leading institutions working in this field. DEA has been successfully used to research airports (Gillen and Lall 1997 and De La Cruz 1999), local government authorities, courts, hospitals general medical practitioners and bank branches to test efficiency where there are multiple centres of inputs and outputs. Its application to the port industry would therefore appear to be ideal. There have however only been a few studies involving seaports using DEA. Martinez-Budria et al (1999) and Tongzon (2001) are two studies using Spanish and Australian ports, respectively. Roll and Hayuth (1983) in a hypothetical study state that DEA is a most suitable tool for measuring port efficiency.

Sachis (1996) looked at the different techniques for measuring productivity and confirmed DEA's usefulness. However his research adopted an engineering method to take account of the technological investments when looking at the efficiency of Israeli ports. Various other studies have used the assessment of productivity based upon output per worker (De Monie 1987), output per wharf (Frankel 1991) whilst others use production functions (Kim & Sachis 1986 & De-Neufville and Tsunokawa 1981)]. Gillen and Lall (1997) looked at airport terminals and chose two outputs, number of passengers and pounds weight of cargo. They chose six inputs: number of runways, number of gates, terminal area, number of employees, number of baggage collection belts and number of public parking places. They conclude that the number of gates has the greatest overall effect upon efficiency. In terms of ports, gates, which facilitate the loading of the cargo, could be equated to loading cranes, and runways to berths.

ANALYSING THE RESULTS

Efficiency can simply be expressed as a ratio of output to input provided that the product only produces one output. However, as most institutions produce multiple outputs from multiple inputs each variable must be given a weighting to produce a more accurate result. Efficiency then begins to resemble the sum of weighted outputs over the sum of weighted inputs. As the method of weighting can be biased towards one particular outcome, the DEA technique allows for each weighted input/output to be seen in its most favourable light. The number of variables entered into the formula mean the less emphasis there will be on any particular piece of data. Therefore Szczepura et al (1992)] argue that the number of variables should be kept to as low as possible. The raw data entered into this study can be seen in table 1.

The results of table 2 show that by applying this analysis two ports are considered to be 100% efficient. The results show that the two most efficient ports are also Apapa Lagos and Richards Bay. These two ports are from the two most developed countries of Africa, Nigeria and S. Africa respectively.

TABLE 1 RAW DATA BEING ANALYSED BY DEA

Port	Country	Total tons throughput	No. of Containers	Total Length of berth [metres]	Container berth length [metres]
Alexandria	Egypt	22,000,000	601,987	10,500	710
Port Said	Egypt	6,232,000	700,000	2,075	600
Abidjan	Ivory Coast	15,441,000	463,865	4,600	800
Mombasa	Kenya	10,600,000	290,500	4,105	668
Monrovia	Liberia	7,000,000	30,000	1,404	609
PortLouis	Mauritius	4,445,570	151,000	2,134	549
Cassablanca	Morocco	20,132,000	420,000	6,080	1,185
Beira	Mozambique	2,120,000	12,126	3,542	1,420
Apapa lagos	Nigeria	9,097,941	1,735,312	4,059	250
Cape town	S. Africa	11,242,432	395,658	12,168	1,554
Durban	S. Africa	31,889,873	1,233,601	15,012	2,128
East London Port	S. Africa	13,800,000	90,000	2,510	500
Elizabeth	S. Africa	6,484,000	250,846	3,518	635
Richards Bay	S. Africa	90,805,073	28,236	5,015	880
Dakar	Senegal	6,438,000	115,039	10,000	2,627

TABLE 2 RELATIVE EFFICIENCY RATING OF SAMPLE PORTS TOGETHER BY RANK

Port	Country	Relative Efficiency	Rank
Richards Bay	S. Africa	100	1
Apapa lagos	Nigeria	100	2
Port Said	Egypt	85.65	3
Abidjan	Ivory Coast	39.03	4

Alexandria	Egypt	37.86	5
East London	S. Africa	37.37	6
Cassablanca	Morocco	32.26	7
Monrovia	Liberia	31.6	8
Mombasa	Keyna	28.62	9
Durban	S. Africa	28.47	10
Port Louis	Mauritius	25.9	11
Port Elizabeth	S. Africa	24.7	12
Cape town	S. Africa	11.72	13
Dakar	Senegal	5.88	14
Beira	Mozambique	3.97	15

The calculations are capped at 100% since this is the maximum efficiency that can be reached. If however this cap is removed then the relative efficiency rating for the Apapa Lagos is 594.96 and Richards Bay 366.80. This means that Apapa Lagos is the most efficient container port examined in this study. The gap between the so-called top two ports that scored 100% and that of third position, Port Said, is quite considerable. Port Said has a relative efficiency rating of 85.65, this is less than one sixth of Apapa Lagos. This difference may result from the main priorities of the top two ports being bulk products for export, whereas the other ports in the study seem to diversify into other areas. Container traffic in Africa is still developing and as mentioned earlier the main throughput of goods for African ports is via the export of bulk raw materials.

CONCLUSION

This study is limited by the relatively small number of ports examined, fifteen. Any conclusions drawn must therefore take this into consideration. Previous studies carried out by the authors, Valentine and Gray (2001a & 2001b) with a greater number of ports and using organisational and ownership structures have shown more significant findings. The use of DEA as a means of testing container port efficiency has also proven successful in helping to highlight the characteristics of an efficient port. In this study though problems were faced with the collection of data and the results must be taken with caution. The results do however shed light onto the ports of Africa and give a useful league ranking of the main ports. Further research is expected to be undertaken comparing the results with organisational and ownership structures.

REFERENCES

- Abdel-Fattah, N, Gray R., Cullinane S. Road freight and privatisation: the case of Egypt, Ashgate, Aldershot, 1999.
- Boardman, A.E. and Vining, A.R., Ownership and performance in Competitive Environments: A comparison of the performance of Private, Mixed and State-owned Enterprises, *Journal of Law and Economics*, Vol. 32, 1989 pp 1-33.
- Borcherding T.E., Pommerehne, W.W. and Schneider, F. Comparing the efficiency of Private and Public Production: A Survey of the Evidence from Five Federal States, *Zeitschrift fur Nationalokonomie/Journal of Economic Theory: Public Production*, Suppl.2, 1982, pp 127-56.
- Bos, D. and Nett, L., Employee share Ownership and Privatisation: A comment, *The Economic Journal*, Vol. 101, 1991, pp 966-969.
- Cargo Systems, IIR Publications Ltd., London March 2000.
- Cass, S. Port Privatisation, Cargo Systems, IIR Publications Ltd., London 1996.

Caves, D.W. et al., Economic Performance of U.S. and Canadian Railroads, In *Managing Public Enterprises*, edited by Stanbury, W.T. and Thompson, F., Praeger, New York 1982.

Chapman, C. *Selling The Family Silver*, Hutchinson Business Books Limited, London, 1990.

Charnes, A., Cooper, W.W., Lewin, A.Y. and Seiford, L.M. *Data Envelopment Analysis: Theory, Methodology and Application*, Kluwer Academic Publishers, London, 1995.

Charnes, A., Cooper, W.W. and Rhodes, E., Measuring the Efficiency of Decision Making Units, *European Journal of Operational Research*, Vol.2, No.6, 1978, pp 429-444.

Containerisation International Yearbook, Informa Group PLC, London, 2002.

De Alessi, L., The Economic of Property Rights: A Review of the Evidence, In *Research in Law and Economics*, Vol. 2, edited by Zerbe, R.O., JAL, Greenwich, Conn., 1980, pp 1-47.

De La Cruz, S.F., A DEA Approach to the Airport production function, *International Journal of Transport Economics*, Vol. xxvi, No.2 June 1999.

De Monie, G., *Measuring and Evaluating Port Performance and Productivity*, UNCTAD Monographs on Port Management, Geneva, 1987.

De-Neufville, R and Tsunokawa, K., Productivity and returns to scale of container port, *Maritime Policy and Management*, Vol. 8, No. 2, 1981, pp 121-129.

Drewry, *North-South Container Trades*, Drewry Shipping Consultants, London, 1995.

Drucker, P., *The age of Discontinuity: Guidelines to Our Changing Society*, Heinemann, London, 1969.

Everett, S. and Robinson, R., Port reform in Australia: issues in the ownership debate, *Maritime Policy and Management*, Vol. 25, No. 1, 1998, pp 41-62

Farrell M.J., The measurement of productive efficiency, *Journal of Royal Statistical Society*, Vol. 120, 1957, pp 253-281.

Frankel, E.G., Port Performance and Productivity Measurement, *Port and Harbours*, Vol. 36, No.8, 1991, pp 11-13.

Frech H.E., Property Rights, the Theory of the Firm, and Competitive Markets for Top Decision-Makers, In *Research in Law and Economics*, Vol. 2, edited by Zerbe, R.O., JAL, Greenwich, Conn., 1980, pp 49-63.

Gillen, D. and Lall, A., Developing Measures of Airport Productivity and performance: An Application of Data Envelopment Analysis, *Transportation Research -E*, Vol.33, No.4, 1997, pp 261-273.

Heikkila E.J., Structuring a National System of Ports, *Portus etc*, Vol. 5 No. 3, 1990, pp 19-23.

Kim, M and Sachish, A., The Structure of Production, Technical Change and Productivity in Port, *Journal of Industrial Economics*, Vol. 35, No. 2, 1986, pp 209-223.

Martinez-Budria, E., Diaz-Armas, R., Navarro-Ibanez, M. and Ravelo-Mesa, T., A study of the Efficiency of Spanish port authorities using Data Envelopment, *International Journal of Transport Economics*, Vol. XXVI, No. 2, June 1999.

Mintzberg, H. *The structuring of Organizations*, Prentice-Hall Inc., Englewood Cliffs, New Jersey, 1979.

Port Development International, Public Participation, March 1999.

Roe, M.S., The commercialization of East European liner shipping: the experience of Poland, *Maritime Policy & Management*, Vol. 26, No.1, 1999.

Roll, Y. and Hayuth, Y., Port performance comparison applying data envelopment analysis DEA, *Maritime Policy and Management*, Vol. 20, No. 2, 1993, pp 153-161.

Sachis, A. Productivity functions as a managerial tool in Israeli ports, *Maritime Policy and Management*, Vol. 23, No. 4, 1996, pp 341-369.

Sommer, D., Private participation in port facilities – Recent trends, Private sector note, No. 193, World Bank Group, Washington, DC, USA, 1999.

Szczepura, A. Davis, C., Fletcher, J. and Bousoffiane, A., *Applied Data Envelopment Analysis in Health Care; the Relative Efficiency of NHS General Practices*, Warwick Business School Research Bureau, Coventry, 1992.

Tandon, P., Efficiency of Privatised Firms - Evidence and implications, *Economic and Political Weekly*, Vol. 32, No. 50, 1997, pp 3199-3212.

Tongzon, J., Efficiency measurement of selected Australian and other international ports using data envelopment analysis, *Transportation Research Part A: Policy and Practice* 35 2, 2001 pp. 113-128.

UNCTAD, *Review of Maritime Transport 2000*, UNCTAD, New York, 2001.

UNCTAD, *Review of Maritime Transport 2001*, UNCTAD, New York, 2002.

Valentine V.F. and Gray R, The measurement of port efficiency using data envelopment analysis, *World Conference on Transport Research*, Seoul, South Korea, 22-27th July 2001a.

Valentine V.F. and Gray R, *Ports: A comparison by organisational structure ownership and location*, *International Conference on Port and Maritime Research and Development and Technology*, Singapore, 29th –31 October 2001b.

Washington Times, *Global Assets Go into Private Hands at a Lively Pace*, 20th July 2000.