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A CONCEPTUAL DEMAND LED MODEL FOUNDED ON THEORIES OF LABOUR MARKET MISMATCH FOR THE CONSTRUCTION AND BUILDING SERVICES INDUSTRY

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Since the recession of the early nineties, the instability in the supply of construction and building services skills has resulted in a skills shortage, a skills mismatch, high unemployment and claimant rates, and the migration and immigration of labour. To redress these will require the development of a sensitive demand led skills acquisition model. Evidence to date, confirms the use of a variety of response strategies and models which have lacked theoretical foundations and have had very little success. This paper outlines the development of a conceptual model based on theories of labour market mismatch, and adopted from earlier work undertaken for forecasting methodology of national demand for construction labour. This approach has yet to be applied to sub-regional labour demand quantification in the UK construction and building services industry, and merits further investigation. The results of this investigation would form part of a continuing study towards “modelling the supply and demand for construction and building services skills in the Black Country”

Keywords: Labour Market, Manpower, Modelling, New Keynesian Theory, Strategies

INTRODUCTION

The construction and building services sector makes a significant contribution to the UK's overall Gross Domestic Product (GDP). Currently, the industry provides a tenth of the UK's GDP employs 1.5 million people and generates £65 billion of work each year (Morton 2002; Anumba et al. 2004; DTI 2005). Regardless of these immense contributions, the sector, since the recession of the early nineties has been characterized by instability in the supply of construction and building services skills, which has in turn resulted in a skills shortage, a skills mismatch, high unemployment and claimant rates, and the migration and immigration of labour (Churchill 1997). Evidence to date however confirms that the use of a variety of response strategies and models have lacked theoretical foundations and have had very little success (Mackenzie et al. 2000; Keskola 2000 and 2003; Courtney 2003). Also, because information on construction and building services skills are mostly reported in aggregated forms (aggregate representation) there is evidence of data paucity at regional and sub-regional levels (Bridging the Gap East Midlands 2003). In turn, this has led to the publishing of significantly varying regional and sub-regional construction and building services specific statistics (see Agapiou et al. 1994; Regional Skills Foresight Report 2003 and ECOTEC 2003). Consequently, it is being argued in recent decades that a better insight into the prospects of satisfying

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employers' needs for work in particular educational background would provide information on characteristics of occupations, their career opportunities, wages and labour market forecast (Heijke 1996).

As a redress, this paper is in search of answers to questions akin to: what labour market theories / theoretical framework underpin already proposed strategies; reliability of existing construction manpower planning technique, consistency and quality of disaggregated information (data); existing framework for collecting and disseminating regional and sub-regional information; distinction between construction unemployment and skills shortage and the need for a demand led model. Overall this paper seeks to increase understanding of the phenomenon of the skills mismatch (unemployment) in the sector by arguing that information management and demand oriented models may provide a better alternative for quantifying and forecasting skilled manpower (construction and building trades) as a precursor to the development of a conceptual demand led model. The remainder of the paper is structured as follows: section 2 discusses the need for sub-regional and regional responses; section 3 discusses models and their applicability; section 4 discusses the essence of a model; section 5 discusses the different classes of unemployment; section 6 discusses the theoretical perspective of the paper as a basis for accepting the New Keynesian theory as a framework; section 7 discusses the concept of wage rigidity; section 8 discusses the conceptual model; section 9 is a specification of the conceptual model; section 10 analyzes the case for a demand led model and section 11 conclusion.

MODELLING REGIONAL CONSTRUCTION AND BUILDING SERVICES PERCULIARITIES

There are some obvious characteristics of the construction and building services sector, which have become synonymous with the sector globally (Morton 2002: 13-14). The employment of craftsmen in the sector is characterized by instability, finite durations of employment services, pool of labour, highly fragmented in nature (Uwakweh and Maloney 1991; Rainbird 1991; Ejohwomu et al. 2005). Dainty et al. (2004) argued that over the past 20 years attempts to understand the severity of construction skills shortages have tended to rely on information generated by econometric models. Although, the reliability and usability of econometric models have been questioned in relation to the reality of extrapolated data, which is a resultant effect of the evolution of econometric models with time i.e. there is correlation between changes made to an existing model and the set required (Heijke 1994). However, within the UK, the CITB employment model, which is the most widely cited (Dainty et al. 2004) might need to rely on a sufficiently holistic employment model if it must accommodate the dynamism of current and future forecasts.

MODELS AND THEIR APPLICABILITY

Except for recent technological advancements in cloning, which many even consider to be unethical, it is very unlikely to find two humans with the same fingerprints or DNA. This arguably applies to industrial sectors, regions and sub-regions. Because of these obvious distinctions, it is not much of a surprise that one of the main causes of regional unemployment differences is the location of declining or growing industries in particular regions (Cheshire and Weeden 1973). Hence, the argument that sub-regional or regional issues candidly require the adoption of a specific sub-regional or regional response strategy. (Bowley 1930) argued that the concentrated presence of coalmining and ship building in North Wales and Scotland caused their post war

decline just as it had caused their nineteenth century prosperity. Today, the Black Country, a sub-region in the North-West of the Midlands is no exception (Ejohwomu et al. 2005).

THE ESSENCE OF A MODEL

In its simplest form a model can be defined as a way of describing a phenomenon. This description could be mathematical, graphical or pictorial, with evidence from literature confirming clearly that no one model can explain every aspect of behaviour in an economy. At a minimum, labour market models should be useful for both market analysis and helpful in the design of labour market information systems, as such there is a gap to be filled (Heijke 1994: 12; Hopkins 2000). It seems because the construction and building services sector is less emphatic on the need for having theoretical frameworks / model in place, for information gathering and dissemination there are inadequate response strategies which arguably might be a core factor for the persistent phenomenon of the sectors skills mismatch. Thus giving rise to a plethora of qualifications, paucity of sub-regional and regional data, and a lack of coordination between the supply and demand sides of the sector. The use of theories and models as a basis for addressing problems or issues associated with complexity or peculiarity sectors may to a great extent guarantee a fundamental understanding of the problem, which is in turn, regarded as a diagnostic phase. Consequently, problems should be best resolved by first understanding (modelling) the nature of the problem.

UNEMPLOYMENT

Evidence from literature confirms the existence of different types of unemployment: frictional, structural and demand deficiency unemployment (Cheshire and Weeden 1973: 11-13). Wherein Frictional Unemployment consists of all those unemployed persons for whom there appear to be vacancies in the categories in which they are registered; Structural Unemployment consists of those for whom there are no vacancies in their own categories in the region, but for whom there would be vacancies if they could change their categories; and Demand Deficiency Unemployment occurs when there is not sufficient demand in the economy to employ everyone who wants a job and tends to occur during recession and periods of economic down turn.

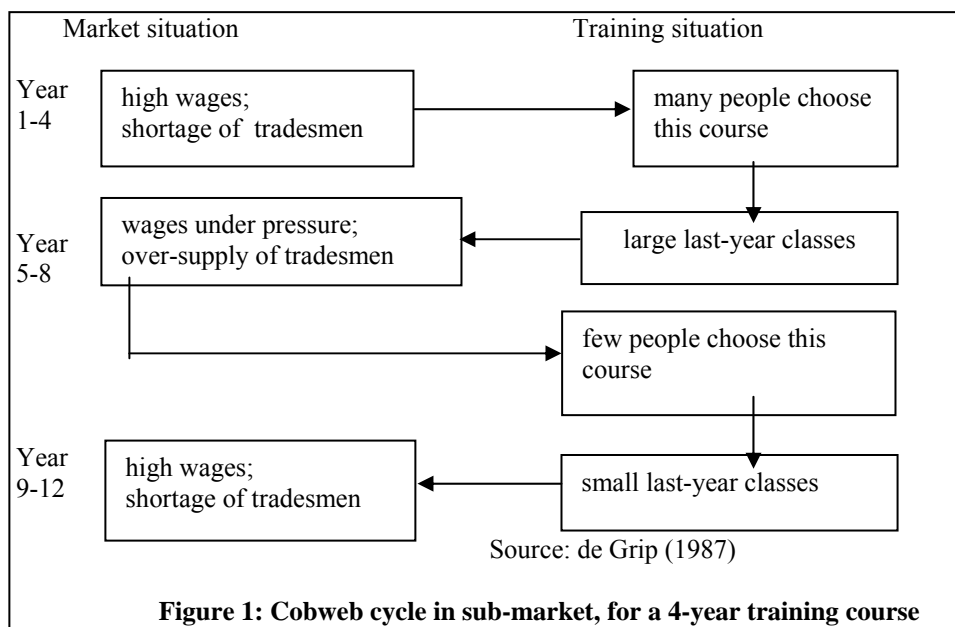
A review of literature seems to suggest that very little work has been done in the area of understanding construction unemployment classification. Thus despite the fact that the first study of unemployment was published in 1909 (Beveridge 1909).

A THEORETICAL PERSPECTIVE

In reviewing major theories of labour market mismatch, Hopkins (2002) purports that a better understanding of manpower planning problems would be helped by examining theories about the determinants of unemployment. However, with unemployment being the pivot of skills mismatches Hopkin's (2002) argument has been adopted as an underpinning concept (framework) for focusing the search for a theoretical standpoint. In turn, this would be adopted from the views held by the leading strands of thought, which today have attempted to explain, among other things, the economic causes of unemployment. In this regards, the theories of foremost economists like Marx and Engels (1932) and Keynes (1936) are exploited as a core for developing this paper's theoretical concept as against others whose views

were channelled towards computable general equilibrium (CGE) models, poverty and entitlements (see Hopkins 2002.)

Consequently, this paper accepts the New Keynesian Theory of Rigid Wages and Prices (Mankiw and Romer 1991) as a theoretical framework for the development of a conceptual demand led model for the construction and building services industry. It is however evident from the literature that there is no one acceptable theory for the resolution of skills mismatch. It is imperative that any economic theory which offers a better understanding of labour market crisis should provide a framework for addressing defects such as the phenomenon of skills mismatch, skills shortages and migration. In trying to capture the effect of wages on a sub-market Heijke's (1996:10-11) cobweb cycle shown in figure 1 below clearly models a wage driven labour market situation, which is in this regards a supply led labour market. This in turn provides a possible explanation for the role and consequences of fluctuating wages in a sub-market for a four-year training course.



In the first 1-4 years the model assumes there is a shortage of tradesmen which then leads to high wages as well as attracting lots of trainees. But in the subsequent 5-8 years where the over supply of trainees pressures wages, few trainees are enrolled. Consequently, in years 9-12 the cycle then reverts back to the original case of high wages and a shortage of tradesmen. The cobweb cycle offers a detailed and logical description of the market situation and therefore provides scope for testing the sustainability of any response strategy symptomatic of an effective model.

NEW KEYNESIAN THEORY

As the focus of this paper is emphasizing the concept of wage rigidity as basis for explaining unemployment the historical background and subsequent development of Keynesian thoughts including criticism have been avoided. For a discussion of these please see (Keynes 1936). The New Keynesian Theory as applied to supply of, and demand for construction and building services skills' labour market seems to offer a logical explanation for interpreting the phenomenon of unemployment, which is a resultant effect of skills mismatch. See figure 2 below for the concept of the New Keynesian economist for non-market clearing (Mcphail 2005).

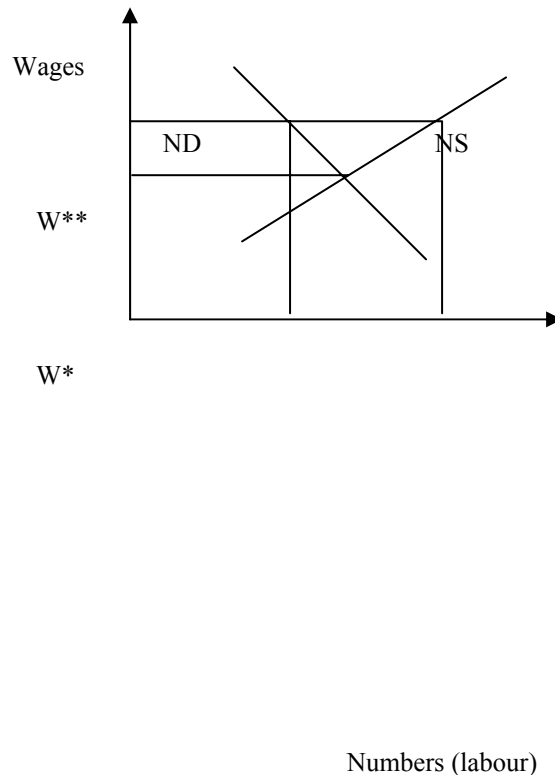


Figure 2: depicts wage rigidity with real wage above market-clearing wage

Figure 2 shows that if real wages are above the market-clearing wage the quantity supplied would exceed quantity demanded. Where:

W^{**} = real wage

W^* = market clearing-wage

NS = number supplied

ND = number demanded

What is of paramount interest to construction and building services labour market at time (t) for project at any location (l) and project type (p) is the market price per unit labour (P/Labour). When market-clearing wage equals real wage (see figure 3) then there is no involuntary unemployment. This wage is considered as the equilibrium wage, as there is no involuntary unemployment and resources are efficiently allocated. Functionally this can be expressed as:

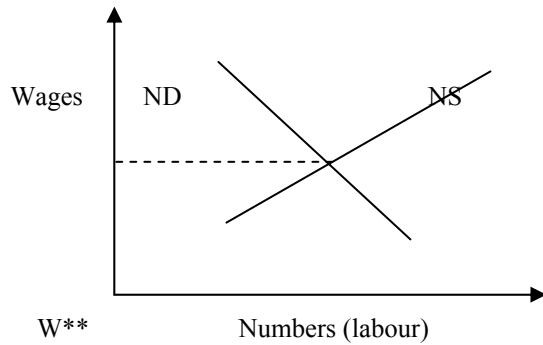


Figure 3: depicts wage rigidity: market-clearing wage equals real wage

If $W^{**} + W^* = 0$ (1)

There will be no involuntary unemployment

If $W^{**} + W^* \neq 0$ (2)

There will be involuntary unemployment

Where: W^{**} is real wage and W^* clearing wage

There have been arguments against the possibilities of attaining a state of equilibrium wage (Friedman 2002). Typically these situations, also described as skills mismatch, occur when there is an imbalance in the supply and demand of construction and building services skills. Thus resulting in high unemployment, high claimant rates, a decline in labour productivity, low retention rates, placement difficulties for apprentices, and ‘unbeneficial’ government policies (CITB 2001).

CONCEPTUAL MODEL

In line with the central focus of this paper, a conceptual demand led model has been devised (see figure 4) in the form of a construction management information system which mirrors the expected qualities of a chartered engineer (Clarke 2005) i.e. being able to ‘creatively use a combination of general and specialist engineering knowledge and understanding to optimise the application of existing and emerging technology; applying appropriate theoretical and practical methods to the analysis and solution of construction and building services’ problems; provide technical, commercial and managerial leadership; use effective communication and interpersonal skills; and make a personal commitment to live by the appropriate code of professional conduct, recognising obligations to society, the profession and the environment’ as a basis for addressing the problem of unemployment.

Ronsfield and Warszaski (1993) argued that this general methodology of study may be unusable because the composition of database #3 in figure 4, which ‘seems to be a plain data collection glean from published labour statistics turned out to be quite complicated.’ However, Ronsfield and Warszaski (1993) argued that it is possible to overcome or bypass numerous obstacles and data gaps by reasoning and making logical assumptions, in order to arrive at a fairly realistic estimation of both demand and supply. Consequently, database #3 should be obtainable by changing data required from existing ‘number of workers in each skill’ to ‘numbers of workers in each trade type by active projects’.

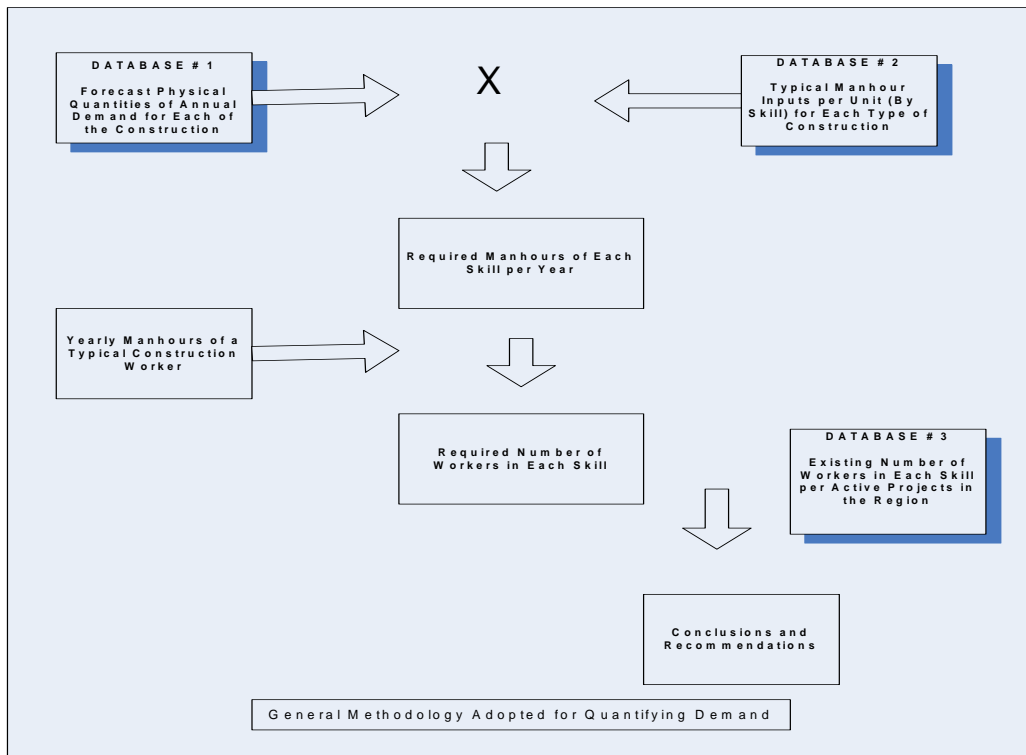


Figure 4: Schematic diagram of general methodology

In turn, information derived from resulting analysis and the acceptance of new Keynesian theory would inform sub-regional and regional response strategies (conceptual model) e.g. the Transparent Black Country Information Systems that already forms part of identified response strategy of a recent Black Country review of supply and demand of construction and building services skills (see Olomolaiye et al. 2005).

CONCEPTUAL MODEL SPECIFICATION

The premise of this conceptual model is that the willingness of the labour market participants to pay for skilled labour (manpower) when the market-clearing wage exceeds real wage is imposed by current supply and aggregated demand for construction and building services skills is revealed in the actual number of manpower employed. Consider for instance W^{**} and W^* to denote real wage and market-clearing wage affecting i^{th} number of manpower supply or demand such that $W^{**} + W^* = 1$ when market-clearing wage is not equal to real wage i.e. instability in the supply of, and demand for, manpower influences wages. And $W^{**} + W^* = 0$ when market-clearing wage equals real wage i.e. there is equilibrium which infers that real wage equals market clearing-wage (See equations 1 and 2 for graphical representation). The cost of the i^{th} number of employed manpower when it is not affected by rigid wages is defined as V_{0i} and, as V_{1i} when affected by rigid wages. Since the wages of any type of skilled manpower remains a function of supply and aggregate demand. Net manpower is in turn the difference between demand and supply of labour at any given point in time. Functionally this can be expressed as:

$$\text{Net Manpower} = \text{Demand} - \text{Supply} \dots\dots\dots 3$$

When there is a shortage of labour net manpower is positive and surplus implies that net manpower is negative.

If labour market participants (demand side) are willing to employ and train, providers are willing to train (supply side) for each identifiable attribute of wages, V_{0i} , to be sure, is a function of all the various attributes if the i^{th} number of manpower. This can be restated functionally as:

$$V_{0i} = \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \dots + \beta_k X_{ki} + e_i \dots\dots\dots 4$$

In which $X_{1i}, X_{2i}, X_{3i}, \dots, X_{ki}$ represents the attributes describing the i^{th} manpower when it is not affected by the rigidity of wages while $\beta_1, \beta_2, \beta_3, \dots, \beta_k$ represents the revealed marginal costs at which constructors and training providers of construction and building services skills to trade the representative attribute. e_i represents the stochastic term that accommodates any envisaged errors of measurement. With the number of labour affected by the rigid wage, equation 4 transposes to:

$$V_{1i} = \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \dots + \beta_w W + e_i \dots\dots\dots 5$$

In which all the repeated variables are as defined above and β_w represents the revealed marginal cost at which constructors are willing to trade the additional attribute brought about by the application of $W^{**} + W^* = 1$ to the number of manpower supplied.

CASE FOR A DEMAND LED MODEL

If the notion that ‘he who pays the piper, dictates the tune’, is acceptable then it is no surprise that researchers are now advocates of a client-led model for procurement in UK construction and building services sector (Agapiou 1998; British Airports Authority 2002; Agapiou 2005). A pragmatic logic would be that, if clients (constructors) ‘buy’ trades for meeting current and future challenges of their business they might as well inform the providers (supply side) of the type of skills they require for achieving efficiency. This might arguably be why Clarke (2005) argued that as a way of accommodating the industries changing skill sets which currently occurs as a result of increasing focus on research there should be increased engagement between industries and training providers as a framework for developing skills.

CONCLUSION

With the New Keynesian theorem offering a logical explanation for the phenomenon of skills mismatch (unemployment), the characteristics of the construction and building services sector can be managed by developing strategic response models founded on economic theories. In addition, the sector needs a nucleus of information sources which would house sub-regional and regionally quantified and forecasted information, as a basis for better insight into what the prospects of satisfying employers’ needs are for workers with a particular educational background. These have proven to be successful in recent years. One of the best known of these attempts is the Occupational Outlook Handbook with information on over 200 occupations, which is published in an updated form by the Bureau of Labour Statistics (BLS) of the US (also see Heijke 1994 and 1996; and Olomolaiye et al. 2005). The results of the general methodology and conceptual models when tested would form part of the continuing PhD study towards “-modelling the supply and demand for construction and building services skills in the Black Country-”.

REFERENCES:

- Agapiou, A. Price, A.D.F. and McCaffer, R. (1995). Planning Future Skill: Understanding Labour Resource Issues. *Construction Management and Economics* 13, 149-161.
- Agapiou, A. (1998). A Review of Recent Developments in Construction Operative Training in the UK. *Construction Management and Economics* Vol 16, 511-520.
- Agapiou, A., (2005). The Role of Public Procurement in Promoting Equal Opportunities in UK Construction: CIB W92/T23/W107 *International Symposium on Procurement Systems, The Impact of Cultural Differences and Systems on Construction Performance* Las Vegas, NV; USA.
- Anumba, C., Dainty, A.R.J., Ison, S. and Sergeant, A. (2004). The Utilisation of GIS in Construction Labour Market Planning Process: The *International Construction Research Conference of the Royal Institute of Chartered Surveyors*, Leeds Metropolitan University.
- Beveridge, W.H., (1909). *Unemployment: a problem of industry*, Longmans Green, London.
- Bowley, A.L., (1930). *Some Economic Consequences of the Great War*, Butterworth, London.
- British Airports Authority (2002). *A Local Labour Strategy for Heathrow and Terminal 5: Phase 1 – Construction*
- Cheshire, P.C. and Weeden, R. (1973). *National Institute of Economic and Social Research – Regional Papers II: Regional unemployment differences in Great Britain and Interregional migration models and their application to Great Britain*, Cambridge University press, London.
- Churchill, S. (1997), *Modern Apprenticeships: A Regional Overview, Education and Training*, Vol. 39 No. 6, pp. 230-6
- CITB – Construction Industry Training Board (2001). *Bridging the Gap: An Analysis of Construction Training and Skills Needs in the West Midlands* available at: www.citb.co.uk/research/reports
- CITB – Construction Industry Training Board (2003). *Bridging the Gap East Midlands* available at: www.citb.co.uk/research/reports
- CITB - Construction Industry Training Board (2003) *Regional Skills Foresight Report (2003)*. West Midlands, available at: www.citb.co.uk
- Clarke, B., (2005). Graduate Civil Engineers: Defining a New Breed, *Proceedings of Institute of Civil Engineers, Civil Engineering* 158 May 2005, Pages 80-87, Paper 13944
- Courtney, R. G., (2003). *A Business Model for UK Construction: ‘Think piece’*, nCRISP (2003)
- Dainty, A.R.J., Ison, S.G. and Root, D., S. (2004). Bridging the Skills Gap: a regionally driven strategy for resolving the construction labour market crisis, *Engineering, Construction and Architectural Management*, no. 11, pp. 275-283.
- Department for Education and Employment (2000). *An Assessment of Skill Needs in Construction and Related Industries, Skills Dialogues: Listening to Employers Research Papers*, DfEE and Business Strategies Ltd, London.
- DTI – Department of Trade and Industry (2005). *The State of the Construction Industry Report, Spring*, DTI, London.
- ECOTEC, (2003), *Black Country Employers Skills Survey*, available at: www.ecotec.com

- Ejohwomu, O. A., Proverbs, D. G. and Olomolaiye, P. (2005). Modelling the supply and demand for construction and building services skills in the Black Country. *Proceedings of the 5th International Conference of Postgraduate Research in Built and Human Environment*, volume1, pp 116 Salford, UK.
- Friedman, L.S. (2002). *The Microeconomics of Public Policy Analysis*. Oxfordshire: Princeton University Press.
- Heijke, H. (ed) (1994). Forecasting the labour market by occupation and education: *The forecasting activities of three European labour market research institutes* Kluwer Academic Publishers, London.
- Heijke, H. (1996). Labour Market Information for Education Investments, *Research Centre for Education and Labour Market, Maastricht*.
- Hillebrandt, P. M, Cannon, J, and Lansley, J. (1995). *The Construction Company in and out of Recession*, Macmillan: London.
- Hopkins, M. (c2002). *Labour Market Planning Revisited*. New York: Palgrave.
- Keynes (1936). *The General Theory of Unemployment, Interest and Money*. Macmillan: London.
- Koskela, L., (2000). *An Exploration Towards a Production Theory and its Application to Construction*, VVT Publications (2000).
- Mackenzie, S., A. R. Kilpatrick and A. Akintoye, (2000). UK Construction Skills Shortage Response Strategies and Analysis of Industry Perceptions, *Construction Management and Economics*, no.18, 831-862
- Mankiw, N. G. and David, R. (eds). *New Keynesian Economics. 2*, available at: <http://www.econlib.org/library/Enc/NewKeynesianEconomics.html>
- Marx, K. and Engels, F. (1932). *The German Ideology*, available at: www.marxists.org/archive/marx/works/1845/german-ideology/
- McPhail, E., *New Keynesian Theory*, available at: www.edwardmcphail.com/intermediatemacro/new_keynesian.htm
- Morton, R. (2002). *Construction UK - Introduction to the Industry* Blackwell Science, Oxford.
- Olomolaiye P., Proverbs, D.G., Leung, M and Ejohwomu, O. (2005). A Review of Construction Skills Supply and Demand in the Black Country, Awaiting publication for uploading on *Black Country's Learning Skills Council*.
- Rainbird, H. (1991). Labour force fragmentation and skills supply in the British construction industry, in Rainbird, H. and Syben, G. (Eds), *Restructuring a Traditional Industry*, Berga, Oxford, pp. 201-20.
- Rosenfeld, Y. and Warszawski, A. (1993). Forecasting Methodology of National Demand for Construction Labour, *Construction Management and Economics*, no.11, 18-29.
- Uwakweh, B. and W. F. Maloney (1991). Conceptual Model for Manpower Planning for the Construction Industry in Developing Countries. *Construction Management and Economics*, no.9, 451-65