

# FACTORS AFFECTING LABOUR PRODUCTIVITY IN THE CONSTRUCTION INDUSTRY

Paul Chan<sup>1</sup>

*Department of Building Engineering and Surveying, Heriot-Watt University, Edinburgh, EH14 4AS, UK*

Much research in the area of construction productivity focussed on the factors affecting labour. However, these studies tend to look at the factors in isolation and thus were inadequate in the recommendations for productivity improvements. This is because labour productivity is a complex and multifaceted issue. Given the recent industrial initiatives of *Rethinking Construction* and *Respect for People*, it is becoming an ever more important agenda to understand the workforce. This study, part of a Ph.D. research into construction labour productivity, attempts to determine how the site management personnel perceives the concept of construction labour productivity and to elicit key factors that would lead to improvements. These perceptions are explored by engaging with the personal constructs of the participants through focus group interviews. The findings suggest a greater emphasis on four key aspects of planning, teamwork, welfare and job security.

Keywords: focus group interviews, labour productivity, personal constructs.

## INTRODUCTION

Understanding about productivity has always been a very important issue in the construction industry. As Chau and Walker (1988: 209) stated, “advances in productivity are one of the means to achieve economic growth and to improve the quality of life and living standards... productivity improvement ultimately means reduced cost of construction and better value for money”. Given the demands of Latham (1994) and Egan (1998) to reduce costs and project time, the revisiting of this statement cannot be timelier. However, despite much research into factors influencing productivity, the trend seems to remain unchanged – that productivity levels are still low. Why is this so?

Chau and Walker (1988: 210) reported that “previous research results concerning productivity of the construction industry are relatively few and the sources are scattered,” indicating that past research into the factors of productivity had been done in isolation. The reality, however, is that construction productivity is a multi-faceted, ubiquitously complex issue (Radosavljevic, 2001); a concept that is difficult to measure and is often defined by reference to the basic resources used, which can be useful in showing trends, but do not necessarily give an accurate picture (Cheetham and Lewis, 2001). Therefore, attempting to improve productivity without the full comprehension of the factors influencing it would be somewhat challenging.

Radosavljevic and Horner (2002: 3) suggested that “labour intensive work, unique design, the number of factors affecting on-site work and other variables make the

---

<sup>1</sup> p.w.c.chan@hw.ac.uk

construction industry unstable in its performance”. It is interesting that they should recognise the labour-intensiveness of the industry as top of the list of factors, as they urge the research community and industry to place more focus on improving labour productivity. As Smithers and Walker (2000: 833) puts it, “the construction process is largely a ‘people’ management business”. Calvert *et. al.* (1995: 152) reinforces this point by stating that “despite the great advances made in the utilization of mechanical plant, building seems certain to remain a high labour-content industry, so that the personnel function is of necessity the most important factor in construction management”. Yet, the understanding of this essential ingredient, labour, poses more difficulties.

Kaming *et. al.* (1997), when reporting on research into determining the factors affecting construction labour productivity, observed that construction labour productivity research projects had primarily employed task (activities) models. Calvert *et. al.* (1995) attributed this to the ‘scientific’ school of thought that governs present day research and blamed the unsolved problem of expanding productivity upon the insufficient regard for the human factor, which they succinctly described as thus:

*“...it is certain that the human sciences such as psychology, sociology etc. hold the promise of unlimited rewards. In the meantime managers must take into account many of the shortcomings of human beings, and draw out the best from the personnel available; whilst man himself, the most complex of machines and the greatest untapped source of power in Nature, remains with a comparatively low utilization factor.” (1995: 169)*

Indeed, even the consolidated efforts of Thomas *et. al.* (1999) and the Factor Model of Labour Productivity (see figure 1 overleaf) failed to explicitly identify the human factor. Nonetheless, the British construction industry is undergoing change. The Movement for Innovation (M<sup>4</sup>I)<sup>2</sup>, responsible for the much-publicized ‘Respect for People’ (RFP) initiative, commented that “change and improvement will only happen through people, and in particular the efforts of all people working in the industry – it is they who ultimately determine practice and performance”. (2000: 6) It is on this premise that this ongoing Ph.D. research is based on.

This paper reports the exploratory stage, which attempts to re-discover the various aspects that affect construction labour productivity, through a series of focus group interviews engaging in Personal Construct Theory (PCT). The results from this paper will then facilitate the modeling of construction labour productivity, which ultimately culminates in the devising of an appropriate strategy to improving construction labour productivity. The paper first offers a brief explanation of PCT. Thereafter, the research method for this study is outlined. The preliminary findings are then presented and the implications discussed.

## **PERSONAL CONSTRUCT THEORY (PCT)**

“Whatever the world may be, man can come to grips with it only by placing his own interpretations upon what he sees. This makes him responsible, and suggests that it is quite inappropriate for him ever to claim that his conclusions have been dictated by any nature other than his own. So we usually do things the way we have done them before or the way others appear to do them.” (Kelly, 1970)

---

<sup>2</sup> <http://www.m4i.org.uk>

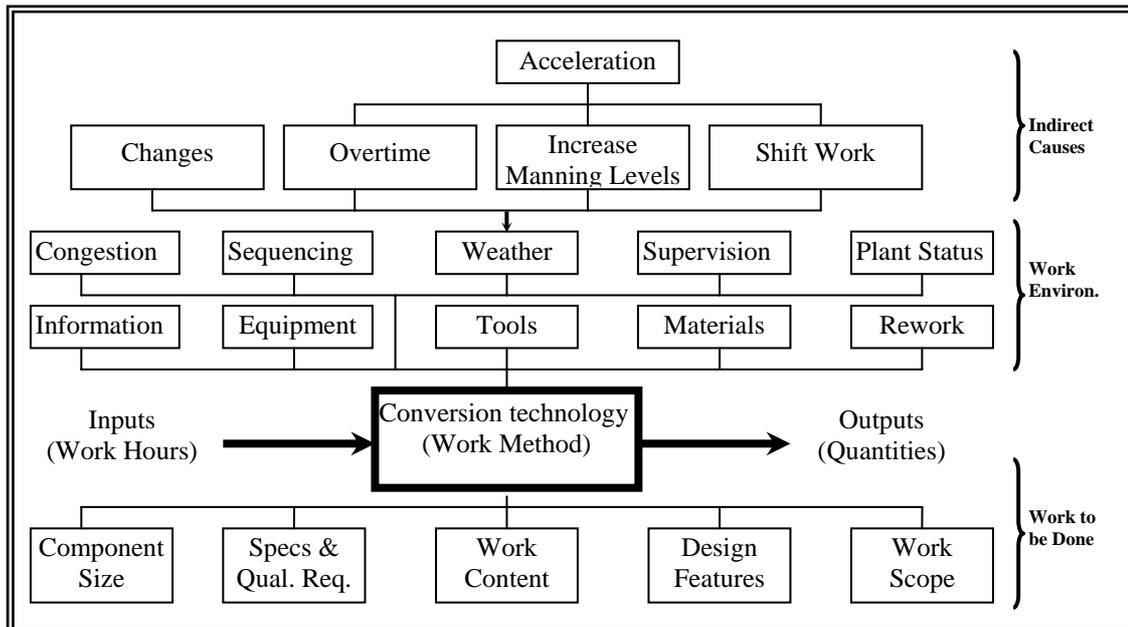


Figure 1: Factor model of construction labour productivity (Source: Thomas and Zavrski 1999)

This forms the basic assumption that the founder of PCT, the late George Kelly, expounds – that “a person’s processes are psychologically channelised by the ways in which he anticipates events”. According to Pidd (1996), this “means that as we enlarge our experiences in daily life, we try to make sense of them. We do this by using our imagination in anticipating what the consequences might be of what we have experienced”. (1996:153)

So, what relevance does PCT have in the quest of understanding construction labour productivity? In the pursuit of gathering information about the human factors affecting labour productivity, PCT offers the prospect of unlocking the vital experiences of the workforce and allows the research community to tap into the ways in which construction operatives view the concept of productivity in the world around them. Often referred to as “Man the Scientist” (Pidd, 1996), PCT enables the breakdown of barriers between researchers and the research subjects who experience the realities of the industry (Boyd and Wild, 1996). This stems from a phenomenological background [(Creswell (1994), Seymour and Rooke (1995))] as opposed to “examining some particular projects and state general conclusions about the problems of the industry through a statistical evaluation of the obtained data” (Radosavljevic, 2001). Furthermore, Bannister and Fransella (1971), when discussing about the issues of reliability and validity of PCT, suggested that “asking a person what he wants to do in the way of work in the future may be more informative than getting him to fill in an oblique questionnaire”. (1971: 77)

## RESEARCH METHOD

In addition to the basic postulate, PCT is also based on a number of corollaries, which are clearly elaborated in Bannister and Fransella (1971) and Pidd (1996). It is not the intention of this paper to re-explain these corollaries, but to present the adoption of these within the research methods involved in this study. The study comprises a series of semi-structured focus group interviews with construction operatives who are involved with site management duties, i.e. foremen or project managers and alike. As a rule of thumb, the foremen/managers had to have a minimum of five years’ on-site

management experience. The main reason for using focus groups are that they are a much quicker (Silverman, 2001), valuable way of gaining insight into shared understandings and beliefs, while still allowing individual differences of opinion to be voiced (King, 1998). Moreover, the reflexive nature of focus groups also complements the employment of PCT. The groups were set up with the assistance of the National Construction College, the training wing of the Construction Industry Training Board (CITB), based in Hillington, Glasgow. In general, the group interview sessions lasted for about an hour each.

There are three main stages in the focus group interviews (see figure 2 below), similar to the one adopted in Boyd and Wild (1996). The first stage, *Construct Explication*, involved the participants in determining their own constructs. This is where participants were each given a pro-forma form for them to put down their perceived solutions to the questions asked. Perhaps the most important corollary of PCT engaged was that of dichotomy, where a person's construct is the basic contrast between two groups (Kelly, 1970). Participants were each asked to write down in the forms, what they first thought of the concept of productivity, and to identify reasons behind the differences between projects that they thought had a high and low productivity level.

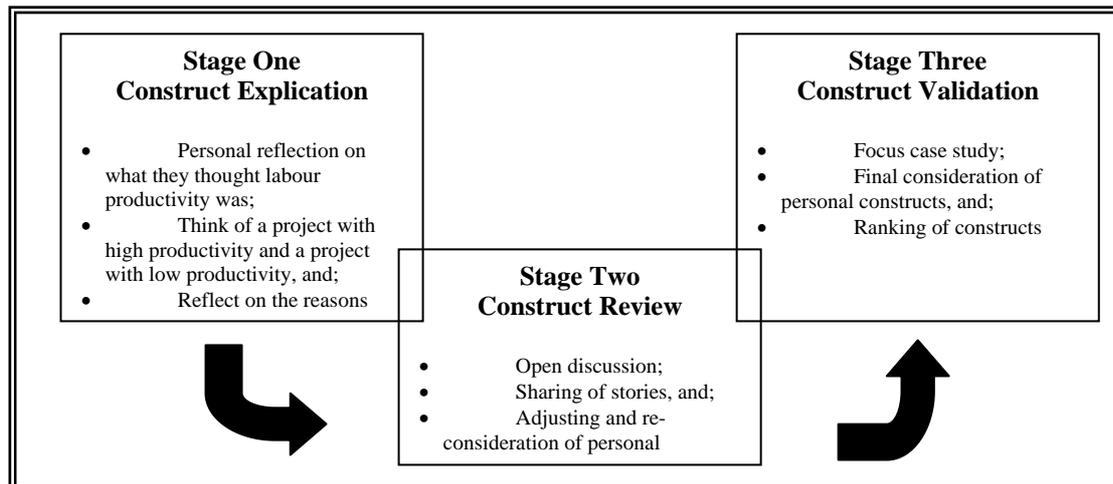


Figure 2: Stages of the study

Stage two, *Construct Review*, involves the review of each participant's personal construct by engaging them in an open discussion of their written 'answers'. The participants were asked to elaborate their points with suitable examples that they could think of from their past experiences. In effect, the participants were storytellers and the researcher simply acted as the observer and offered the occasional stimulus to the storytelling. During this stage, participants were allowed to agree or disagree with the fellow participants. Participants were also free to share their opinions with regards the perceived reasons to the events in other participants' stories. By engaging in this constant debate, the participants adjusted their own position and fine-tuned their personal constructs. This stage exploits mainly the fragmentation and sociality corollaries. The first being that within each person's construct system, there will be construct subsystems that might be logically or inferentially incompatible (Pidd, 1996); the latter being one of the very important aspects of PCT – dealing with interactions between people (Fransella, 1970), a key corollary that explains why we bother with each other at all (Bannister and Fransella, 1971).

The final stage, *Construct Validation*, is where the researcher introduced a hypothetical case study. This is a typical construction project that runs through the Christmas and New Year festive period. The builders had to improve productivity as a result of a client's, in this case a sports council, request to meet an earlier deadline for the Commonwealth Games. A few conditions were set out, for instance the employment of directly employed tradesmen, the utilization of nominated subcontractors, an indication of the qualifications of the workforce and a brief description of the building frame and construction technology involved. The participants were asked to share with the group on how they would attempt to meet the reduced deadline. It is the intention of this stage to get the participants to validate their personal constructs, and engage them in the organization corollary, which states that every individual organizes their personal constructs by forming a hierarchical (i.e. ranking) system (Pidd, 1996).

## PRELIMINARY FINDINGS

This section highlights the preliminary findings of the three focus group interviews conducted so far. The profile of the participants on each of the focus group is tabulated in table 1 below.

**Table 1:** Profile of participants in focus groups (FG)

		<b>Job Function</b>	<b>Type of Work</b>	<b>Experience</b>
<b>FG1</b>	Participant A	Supervisor	Main Contractor	20 years
	Participant B	Site Manager	Main Contractor	10 years
<b>FG2</b>	Participant C	Construction Manager	Main Contractor	25 years
	Participant D	Clerk of Works	Main Contractor	30 years
<b>FG3</b>	Participant E	Works Manager	Conservation	10 years
	Participant F	Plant Manager	Construction Plant	20 years
	Participant G	Works Manager	Conservation	15 years

### What is productivity?

With the exception of participants E and G, all the other participants construed that productivity meant that the work was completed within the time, cost and quality framework. It is interesting to note that time seems to be the most important criteria with most of the participants equating "abiding by the programme" to productivity. As participant C comments,

"that is all I ever work with... quality was never an issue. It was more to do with time."

Participant F elaborates the importance of time to productivity, with reference to his experience with health and safety,

"It's starting to get too much. Whereas health and safety is paramount... the amount of paperwork involved and the level of responsibility that is placed on us for health and safety, and you've still got to meet at the end of the day to talk about how to improve productivity. Why? You are reducing the hours of a day!"

Conversely, participants E and G, who deal mainly with the conservation of historic buildings, felt that productivity for them meant that the job was finished to the level in which "they were happy with", indicating that quality was a more important agenda for conservation than time. Nonetheless, all participants agree on the fact that increases in productivity would be ideal although none of the participants seem to think that high productivity level is the exception rather than the rule.

## **Differences between projects with high and low productivity level**

The key differences are summarized below (see also table 2).

### *Planning*

The ability to plan and organize all aspects of the work – materials, plant and resources – was cited to be the top priority for participants in FG1 and FG2. Indeed, there is a necessity to get it right the first time. The preliminary site setup was seen to be the most crucial part of the project, as bad planning of e.g. site access routes, placement of stores etc. could mean a reduction of productivity in later parts of the project in terms of double handling or rework.

Another important issue was the experience of the planner when devising the initial time schedule. Because much emphasis was placed on time, the participants felt that it was essential that the planner had to come up with a realistic time plan. As participants A and B, who incidentally worked on the same project about a decade ago, commented on the project:

*“that (referring to the project) was a disaster. Timescales were too tight. They (the planners) tried to do the job in six weeks... when we’d estimated that it should take at least ten weeks.”*

Hence this was not a case of low productivity, but rather improper planning leading to perceived low productivity. There was also a unanimous view that construction operatives are very task-motivated. Therefore, it is felt that bad planning resulting either in rework or unachievable targets would be a demotivating factor for the operatives, leading to a downward spiral in productivity.

Additionally, the task itself was also an area of concern. Although repetitive work may increase productivity through a learning curve, some participants indicated that it was also dependant on whether the task involved required the utilization of the operatives’ skills or not. Generally, it was felt that a repetitive, “non-exciting” job (e.g. a basic rectangular concrete frame building in a Greenfield site) might bore the operative and subsequently reduce productivity.

### *Feeling part of the team*

The participants believed that they had started out in the industry when it was perceived to be both confrontational and aggressive. However, they claimed that the younger generation needed to feel involved and be empowered. Feeling part of the team meant that communication was vital in projects – communication not merely in terms of on-the-job communication, but also between senior management and operatives. The need to communicate company strategy to the operatives becomes more apparent when a project is evidently running at a loss, as summed up as follows:

*“For example, I am now running three housing association projects. Before the start of each project, I attend a pre-project briefing and one of the things discussed are the financial issues. On one of the projects, we realize that we were working at a loss. This affected the staff’s morale and subsequently productivity, simply because they did not know why they had to operate at a loss.”*

The same participant contended that had the company given a valid reason, e.g. repeat business, the operatives would not be affected, as they understood the bigger picture.

The level of training investment was also considered to be a significant issue. It was perceived that training was vital in ensuring that the operatives were qualified to do

the job. Lack of training implied the likely consequence of rework, which would affect productivity. Additionally, it was felt that a company that trains sends out a positive message to the operatives – that they were recognized as being part of the team.

However, there is also a paradox in teambuilding. Very often, the workforce is fragmented along the lines of traditional trades, e.g. joinery, steel fixing. From the perspective of individual trades, this represents a good thing in terms of esprit de corps. However, participants C and D noted that this strong sense of identity may not be ideal in boosting productivity if a particular trades operative e.g. steel fixer fails to help out an operative from another trades e.g. concrete operative even when there is no more steelwork left to do. As participant C lamented,

*“in terms of production, it is bad because the output in the end of it is a combination of efforts.”*

Participant D added that this would be where co-ordination and re-assigning of tasks by the foreman is needed to ensure that none of the operatives are left idling, although he qualified that in the case of a steel fixer, it would certainly still be within the area of steel fixing.

#### *Site welfare*

Site welfare is considered to be essential in today's construction. One needs to create a workplace that operatives feel is a place fit to work in. This involves the provision of proper clothing (hard hat, overalls, sweaters, boots and protective gear), clean amenities (canteen, changing rooms, toilets and heating) and most importantly, a site manager who “listens and manages with a heart”. However, it is felt that

*“productivity will not increase with these gestures, but will certainly decrease dramatically if these were not provided.”*

Participant C added that education of the workforce was also required to inculcate in the operatives the culture of respect, for he felt that

*“it all depends on them; if there wasn't a cleaner to do the job, the toilets will never be clean.”*

Another interesting point in welfare relates to traveling time. It is common especially in countries like the UK for construction operatives to travel long distances to their workplace. Although it was a concern raised by the participants, they felt that this did not contribute much to productivity movements since most tradesmen are employed locally (i.e. within a radius of 40 miles). Therefore, the only concern may lie with the provision of site management staff, who will normally be reimbursed by the company should traveling be an issue.

#### *Job security*

Job security was also cited as a very important factor in increasing productivity. A company that tries to keep its operatives was perceived to have lesser problems with absenteeism (hence lost days) and a higher level of employee loyalty. One of the participants even noted that most of his projects would almost certainly come to a relatively unproductive end simply because the company is not very good in keeping its employees informed of what would happen after the project ended. Participant F gives a cynical view of the industry as such:

*“In our industry, a company in the size of the one that I work for employs... an awful lot of people on an awful lot of projects... Let's say in December,*

*we have twenty jobs going, and say, in April, we have only five jobs going. What do we do to the workforce? We make them redundant. So, in a lot of the times, we lose the good people most of the time. So, in April, we've not got many jobs, so we've not got so many people. But, by the time July comes, and these tenders come back, we've got another twenty jobs... the men whom we've made redundant have gone working for somebody else. So, we will put that out to subcontractors to do the job. Or if it is labour, we go out and get agents... who would probably assemble the workforce at eight o'clock the night before at a pub. So, you want to know why productivity is low. The guy who has been recruited in the pub the night before, do you think he is interested in the company that I work for?"*

Table 2: Differences in project characteristics

<b>Projects with high productivity</b>	<b>Projects with low productivity</b>
Well-thought out, realistic plan	Poor planning, inexperienced planner
Building design that enables the use of trade skills	Repetitive, simple design that uses very little or none of the trade skills
Good communication between senior management and operatives	'Them' and 'Us' attitude between senior management and operatives
Training investment	Lack of training
Experienced staff	Inexperienced staff
High staff morale	Low staff morale
Good welfare	Little or no welfare
Experienced and self-motivated site manager	Inexperienced site manager
Site near to home	Site far away from home
Job security and retention of staff	Subcontractors or Labour only subcontractors

### Mini case study

All the participants on the focus groups chose to go for shift work, overtime and the introduction of bonus schemes when considering ways in which they could reduce the overall project time. Changes to plans and the revisiting of construction technology were also considered in improving efficiency. "More money" was cited to ease the facilitation of such short-term measures. However, all the participants conceded that although money may be the key motivator where subcontractors are concerned, it was essential to first achieve the long-term measures of good teamwork, high staff morale, adequate welfare, training investment and job security issues before being able to employ the short-term measures effectively on directly employed labour.

## IMPLICATIONS

The findings presented above represent emerging issues to be analysed in closer detail in the next stage of this research as opposed to the presentation of eventual findings. This is due to a couple of reasons. First, Silverman (2001) suggested that half a dozen interviews would be needed to generate sufficiently credible data. Therefore, the data collected so far merely offers the reader a flavour of the final results. Moreover, although an effort was made to ensure between six to eight participants per focus group, this proved to be a great challenge for the researcher since the participants were sought on a voluntary basis. Nevertheless, it is felt that the trends gathered from the interviews shed more light to the understanding of construction labour productivity.

The study highlights a need to consider the creation of a favourable working environment (i.e. presence of site welfare and effective teamwork) when aiming for productivity improvements. This central belief echoes the three Rs (respecting, recruiting and retention) put across by the M<sup>4</sup>I. However, whilst the M<sup>4</sup>I's main focus

is to fulfil the three Rs at the industrial level, it is even more essential to focus empowerment at the project level. In particular, retention of experienced staff is beneficial for improving productivity over time, given the fact that construction labour moves from project to project; such retention would appear to mitigate time loss due to re-orientation on a new project (Zakeri *et. al.*, 1996). This would also encourage a greater sense of job security on construction projects, which the participants believe would lead to greater productivity.

In order for such retention to be possible, it is important that the firm invests in training. The industry is perceived to be reliant on qualified labour and training is seen to be an indicator of team building. However, it is unfortunate that the industry is notorious for its low level of training and thus need improvement.

Site management appears to be the underlying factor that brings about productivity improvements. The technical know-how, experience and most importantly a management style geared towards respect are all fundamental components of a good supervisor. However, given the perceived requirement of a self-motivated site manager, and the way in which the participants construe productivity to equate time, it is perhaps essential that the industry study the impact of working time (including such time as travelling time and bureaucratic time needed to say, complete forms) of supervision staff.

## CONCLUSIONS

This paper reviews the shortcomings of past research into the factors affecting construction labour productivity. It had been established that the research community and industry failed to address the human factors that influence productivity levels. By engaging with the personal constructs of site management staff, through a series of focus group interviews, four key areas – planning, teamwork, welfare, job security – have been highlighted as aspects leading to productivity improvements. A closer examination of these issues and their impact on labour productivity are being undertaken in the hope of developing a strategy for improvements.

## ACKNOWLEDGEMENTS

The author would like to thank the National Construction College (Glasgow) and O'Rourke Scotland Ltd for arranging the focus group interviews, and the participants who volunteered their time to offer valuable input into this study.

## REFERENCES

- Bannister, D and Fransella F (1971) *Inquiring man: the theory of personal constructs*. Baltimore: Penguin Education.
- Boyd, D and Wild, A (1996) Engaging with personal constructs to improve construction projects. In: Thorpe, A (Ed.) *Proceedings of the Twelfth Annual ARCOM Conference*, September 1996, Sheffield, Association of Researchers in Construction Management.
- Calvert, R E, Bailey G and Coles, D (1995) *Building management*, 6ed. Oxford: Butterworth-Heinemann.
- Chau, KW and Walker, A (1988) The measurement of total factor productivity of the Hong Kong construction industry. *Construction management and economics*, 6, 209-224.

- Cheetham D W and Lewis, J (2001) Productivity, buildability and constructability: is work study the missing link? In: Akintoye, A (Ed.) *Proceedings of the Seventeenth Annual ARCOM Conference*, 5-7 September 2001, University of Salford, Association of Researchers in Construction Management, Vol. 1, 271-280.
- Creswell, J (1994) *Research design: qualitative and quantitative approaches*. California: Sage publications.
- Egan, J (1998) *Rethinking Construction*. Department of the Environment, Transport and Regions, HMSO, London.
- Fransella, F (1970) ... And then there was one. In: Bannister, D (ed.) *Perspectives in personal construct theory*. London: Academic Press.
- Kaming, P F, Olomolaiye, P O, Holt, G D and Harris, F C (1997) Factors influencing craftsmen's productivity in Indonesia. *International journal of project management*, **15**(1), 21-30.
- Kelly, G (1970) A brief introduction to personal construct theory. In: Bannister, D (ed.) *Perspectives in personal construct theory*. London: Academic press.
- King, N (1998) Template analysis. In: Symon G and Cassell C (ed.) *Qualitative methods and analysis in organizational research: a practical guide*. London: Sage publications.
- Latham, M (1994) *Constructing the Team*. London: HMSO.
- M<sup>4</sup>I (2000) *A commitment to people "our biggest asset"*. Respect for People Working Group Report, Rethinking Construction.
- Pidd, M (1996) *Tools for thinking: modeling in management science*. John Wiley & Sons.
- Radosavljevic, M (2001) Autopoietic organization of firm: an illustration for the construction industry. In: Akintoye, A (Ed.) *Proceedings of the Seventeenth Annual ARCOM Conference*, 5-7 September 2001, University of Salford, Association of Researchers in Construction Management, Vol. 1, 121-131.
- Radosavljevic, M and Horner, M W (2002) The evidence of complex variability in construction labour productivity. *Construction management and economics*, **20**, 3-12.
- Seymour, D and Rooke, J (1995) The culture of the industry and the culture of research. *Construction management and economics*, **13**, 511-523.
- Silverman, D (2001) *Interpreting qualitative data: methods for analyzing talk, text and interaction*, 2ed. London: Sage publications.
- Smithers, G L and Walker D H T (2000) The effect of the workplace on motivation and demotivation of construction professionals. *Construction management and economics*, **18**, 833-841.
- Thomas, H R and Zavrski, I (1999) *Theoretical model for international benchmarking of labour productivity*. Pennsylvania Transportation Institute, 4.
- Zakeri, M, Olomolaiye, P O, Holt, G D and Harris, F C (1996) A survey of constraints on Iranian construction operatives' productivity. *Construction management and economics*, **14**, 417-426