

10 STATEMENTS ON PRODUCTION AND CONSTRUCTION THEORY

Trond Bølviken¹

ABSTRACT

Koskela sees production as the production of value through a flow of transformations. He analyses peculiarities characterizing the construction industry, and advocates elimination and mitigation strategies in order to reduce the disadvantages related to these peculiarities.

This paper sees *industrialised* production as production of *commodities* through a flow of transformations. The commodities are seen as having dual character, possessing both use-value and price (exchange value). Within “the Lean Construction – movement” the understanding and examination of the commercial dimensions of construction is far behind the understanding of more technical or organisational issues like planning and scheduling. The commodity-term, distinguishing between the use- and monetary value-dimensions, should also be able to contribute to a better understanding of the commercial dimensions of construction.

A specific industry is characterized by its specific peculiarities. This means that the existence of peculiarities is not something that is specific only to the construction industry, but which is found in all industries. As a consequence, elimination and mitigation of peculiarities in order to reduce disadvantages can no longer be seen as sufficient strategies. This paper also sees peculiarities as a potential advantage, and advocates strategies where these potential advantages are explored.

¹ Director, Business Development and Strategy, Veidekke Entreprenør AS, Postboks 506 Skøyen, N-0214 Oslo, trond.bolviken@veidekke.no (Veidekke Entreprenør AS is a Norwegian subsidiary of Veidekke ASA, one of the major Scandinavian construction and real-estate-development companies)

INTRODUCTION

This paper is an attempt to comment and further develop the theory of production and construction as presented by Koskela (2000):

- While Koskela sees production as the production of *value* through a flow of transformations, this paper sees *industrialised* production as production of *commodities* through a flow of transformations.
- While Koskela sees peculiarities as something that characterizes the construction industry, this paper sees peculiarities as something that characterizes any industry. The peculiarities are divided into basic and non-basic peculiarities, and a list of basic peculiarities of the construction industry is suggested.
- While Koskela only analyses the elimination and mitigation of peculiarities in order to reduce disadvantages, this paper also sees peculiarities as a potential advantage, and advocates strategies where these potential advantages are explored.

THE 10 STATEMENTS

1. *Industrialised production can best be understood as the production of commodities through a flow of transformations.*

This is not a theory of production as such, but of *industrialised* production. I could also have used terms such as *modern, capitalistic* etc. As I see it, it is not the term used that is important. Instead, what is important is to understand that this is not a theory of any type of production, but of a specific historical form of production.

Koskela understands production as the production of *value* through a flow of transformations. However, the product of the industrialised production process is *a commodity* (with value), not *value* as such. As pointed out by the classical theory of Political Economy, the commodity has two principally different types of value. Adam Smith and David Ricardo call the one type of value “value in use”, and the second “value in exchange”, “exchangeable value”, “money price” or just “price”². Karl Marx (1873) analyses the commodity as “an object with a dual character, possessing both use-value and exchange-value”³. “The commodity is, first of all, an external object, a thing which through its qualities satisfies human needs of whatever kind. The nature of these needs, whether they arise, for example, from the stomach, or the imagination, makes no difference. Nor does it matter here how the thing satisfies man’s needs, whether directly as a means of subsistence, i.e. an object of consumption, or indirectly as a means of production.”⁴ “The usefulness of a thing makes it a use-value.”⁵ On the other hand the expression of the exchange-value of the commodity is “its money-form or price.”⁶

² Smith, pages 41, 43, 47 and 53, Ricardo page 17

³ Marx, page 131

⁴ Marx, page 125

⁵ Marx, page 126

⁶ Marx, page 189

2. *In order to use this paradigm in a theory of a specific industry, two analytical levels have to be added:*
- *The understanding of the basic peculiarities of the industry in question, and*
 - *The understanding of the non-basic peculiarities of the industry in question*

A specific industry is characterized by its specific peculiarities. This means that the existence of peculiarities is not something that is specific only to the construction industry, but which is found in all industries. The peculiarities interact, creating a situation where a difference in only one or a few of the peculiarities can establish qualitatively different situations in industries with a majority of similar peculiarities. For example, both the construction and shipbuilding industries have many peculiarities in common. However, ships are movable while buildings are not, resulting in very different approaches. For example, project financing and international specialisation.

The reason for dividing the peculiarities into basic and non-basic, is to be able to distinguish between the peculiarities related to an industry as such (basic), and the peculiarities in a given period of time, geography, market etc (non-basic). The basic peculiarities cannot be changed. All we can do is to accept and understand them. Non-basic peculiarities on the other hand can (in practice or theory) be changed.

3. *The non-basic peculiarities can have an unlimited number backgrounds, such as historical, cultural, commercial etc. However, they can be divided in two main groups:*
- *Specific answers to the basic peculiarities of the industry in question, and*
 - *Any other reason*

The non-basic peculiarities can be specific answers to the basic peculiarities of the industry in question or have any other backgrounds, such as historical, cultural, commercial etc. An example of a relation between a basic and non-basic peculiarity is the relation between buildings being fixed to the ground as the basic peculiarity and a high amount of on-site-production as a non-basic peculiarity. (See statement 8)

Because non-basic peculiarities can be divided into those connected to basic peculiarities, and those having any other historical, cultural or other type of origins, two different analytical challenges occur. Because some of the non-basic peculiarities are so tightly connected to basic peculiarities, they can easily be understood as basic, and therefore not be regarded as something that (at least in theory) can actually be changed. On the other hand, peculiarities having other historical, cultural or other types of origins, will be similar in many or all industries in the historical phase or in a specific (national or geographical) culture. Because peculiarities occur “everywhere”, they can easily be overlooked and not be regarded as a peculiarity at all. In this case, they can be wrongly interpreted as being “natural”, “inevitable” etc.

4. *The theory should be used through specific analyses. These analyses can be done for several purposes⁷:*

⁷ Koskela, page 25-26, and 251

- *Explanation*
- *Prediction*
- *Direction*
- *Tools for decision and control*
- *Communication*
- *Learning*
- *Transfer*

From Koskelas list “Testing” is not included. The reason for this is that testing to me seems like something that can and should be done, but not as a purpose as such.

5. *The theoretical levels established above, can be named:*

- *A (general) theory of industrial production (1)*
- *A (general and specific) theory of a specific industry (2 and 3)*
- *Analyses of a specific industry (4)*

The (general) theory of industrial production analyses the common phenomena in all industrial production. Parts of the lean production theory can be seen as contributions to the (general) theory of production (although a specific industry is the bases for the analysis).

The (general and specific) theory of a specific industry analyses the common phenomena within the industry in question by examining the peculiarities of the industry.

A specific analysis is carried out through the combination of selected elements from the different theoretical levels.

6. *A specific analysis is carried out by combining (one or more of) the general elements in the theory of industrial production with (one or more of) the peculiarities of the industry in question. Three different strategies can be adopted:*

- *How to eliminate the peculiarities to avoid disadvantages*
- *How to mitigate the peculiarities to avoid disadvantages*
- *How to use the peculiarities to gain advantages*

Koskelas sees the peculiarities of the construction industry as disadvantages dividing the industry from (all?) other industries. His strategy is therefore the elimination or mitigation of these peculiarities.⁸ My position is that all industries are characterized by their specific peculiarities. The peculiarities can therefore represent both advantages and disadvantages, making both elimination-, mitigation- and active use- strategies necessary to examine.

⁸ Koskela, page 212, 231-235 and 239

7. *In our case the industry in question is the construction industry. The theoretical levels can therefore be named:*

- *A theory of industrial production*
- *A theory of construction*
- *Analyses of the construction industry*

Statements 1 – 6 present an approach to the understanding of industrialised production in general, and are not specific for the construction industry. The application to the construction industry is described in the statements 7 – 10.

8. *The basic peculiarities of the construction industry are:*

- *Buildings are fixed to the ground*
- *Buildings are unique (one-of-a-kind)*
- *Buildings are expensive*
- *Buildings have big public interest*
- *Construction is projects*
- *Construction is a complex process*
- *Construction takes time and buildings last long*

Koskela doesn't distinguish between the two types of peculiarities, and finds it "convenient to group the significant peculiarities of construction (...) into the three major categories: one-of-a-kind nature of projects, site production and temporary organisation".⁹

I agree with Koskela that the one-of-a-kind nature of projects is a basic peculiarity of construction. It is tightly connected with the peculiarity that the building is fixed to the ground. Even though two buildings can be identical, they can never be located on the same site, and are therefore always unique. Koskela sees the site production as *The Peculiarity*, I see site production as a consequence of the building being fixed to the ground as the basic peculiarity. Due to the building being fixed to the ground, construction will always have to be carried out as a combination of on- and off-site production.

Koskelas third peculiarity is the temporary organisation of construction projects. I think this should be regarded as a consequence of the uniqueness and project nature of construction, but not as a basic peculiarity. Although it seldom is seen, construction can be carried out by a non-temporary organisation moving from one project to the next.

9. *Some examples of important non-basic peculiarities are:*

- *Temporary organisation*
- *The different trades*
- *Laws and regulations regarding real estate property*

⁹ Koskela, page 181

The above three examples of non-basic peculiarities seem to me to be some of the most important to examine.

Temporary organisation is by far the most common in construction, and it has been analysed as to how to eliminate or mitigate the disadvantages of these temporary organisations. However, it is becoming more and more evident that temporary organisations also have advantages, and they are for example “being advanced as a future production mode in the framework of agile manufacturing and virtual production”.¹⁰

The division of trades is important in the construction industry. Many of the trades have hundreds of years of history. The trades will therefore tend to be conserving elements in the industry. On the other hand, we know from history that trades can both arise and disappear in a short time due to changes in technology and organisation.

Laws and regulations regarding real estate property have a large impact on the construction industry. Most of this legislation has other purposes than simply regulating the construction industry. However, the unintended effects on the construction industry are often significant.

10. *Implications: By combining one or more of the terms on each level of the model, different analyses can be carried out. The model has possible implications for all the different scopes in the use of the theory (statement 4).*

CONCLUSIONS

The three most important perspectives in this paper are:

- Industrial production is seen as production of commodities, and commodities are seen as possessing both use-value and exchange-value.
- Peculiarities are seen as something that characterizes any industry
- Elimination and mitigation in order to reduce disadvantages, and active use in order to gain advantages are seen as the three possible strategies on how to approach the peculiarities.

To distinguish between “production of commodities ...” and “production of value ...” might seem like a purely semantic distinction. However, in my view it might actually be the source of new understanding and research. Of the three dimensions in Koskela transformation – flow – value – theory, the value dimension is by far the less understood and examined. Within the Lean Construction “movement” the understanding and examination of the commercial dimensions of construction is far behind the understanding of more technical or organisational issues like planning and scheduling.¹¹ Of course, one of the reasons for this is that academia has been more active in the movement than the industry. I would also argue that the absence of the commodity- term, and the use of the value- term without distinguishing between the use- and monetary dimensions of the term, have also contributed to the lack of focus on the commercial dimensions of construction.

¹⁰ Koskela, page 182

¹¹ One example of a commercial perspective is Sacks (2004).

Up to now, *The Last Planer System* seems to have been the most important contribution to the lean construction theory and to the forward movement of the construction industry. The last planner system can be seen as an example of a specific analyses or tool developed within the model presented in this paper:

- From the theory of production the flow dimension has been focused on, with the focus on pull-logistics as a result
- From the theory of construction the consequences of the basic peculiarities uniqueness, project nature and complexity of construction has been focused on. Due to these peculiarities, there is a need to utilise the competence of all participants in the project, and the management has to be carried out through distributed planning and control.
- From the theory of construction the consequences of the non-basic peculiarities of the different trades and of the sub-contracting systems are analysed in order to identify the actual “last planer” and to work out practical tools to be used.

The construction industry has in many ways been regarded as an underdeveloped industry. As pointed out under statement 9, it is argued that changes in other industries are now developing practises from the construction industry, which will be feasible in these industries. In the future, the construction industry could very well be considered to be in the forefront of industrial development and being able to deliver conceptual ‘nutrition’ to other industries.

Through thorough analyses of the peculiarities in the construction industry, it should be possible to move beyond the elimination- and mitigation- strategies, and to also explore how to use the peculiarities in order to gain advantages. Only in this way can the construction industry move from a follower- to a lead-position in parts of the industrial development.

REFERENCES

- Koskela, L. (2000). *An exploration towards a production theory and its application to construction*, Technical Research Centre of Finland (VTT), Espoo.
- Marx, K. (1873). *Capital Volume I*, Penguin Classics (1990).
- Ricardo, D. (1821). *Principles of Political Economy and Taxation*, Prometheus Books, New York (1996).
- Sacks, R. (2004). “Towards a lean understanding of resource allocation in a multi-project sub-contracting environment” *Proceedings of the 12th Conference of the International Group for Lean Construction*, Bertelsen, S., and Formoso, C., (Eds.) Helsingør, pp.79-110.
- Smith, A. (1776). *The Wealth of Nations*, Bantam Classic, New York (2003).

