Soft Wholes in the Management Practice

Mark P Mobach

Department of Systems Research, University of Groningen, The Netherlands
E-mail: M.P.Mobach@bdk.rug.nl

ABSTRACT: *Decomposition is a way to reduce complexity. After all a problem split up into manageable parts will be easier to understand than a complex whole problem. It is however a tricky, sometimes even impossible task to reconstitute these parts back to the whole. Within Soft Systems Methodology (SSM) we are advised to think in 'wholes'. Within the (broader) systems approach the idea of 'wholes' relates to concepts such as layered structure, links and emergent properties. These concepts are rather hard to use for managers in practice. The paper tries to improve the usability of these concepts in practice.*

Keywords: Decomposition, Particles, Soft Systems Methodology, Wholes

INTRODUCTION

Wholeness has been one of the core concepts in any systems description ever since the first ideas of the systems approach, in fact, it was also used by the ancient Greeks to describe the word system: 'a whole composed of related parts' (Vickers 1983). Ever since, the world has developed but the concept is, although it appears rather wide and vague, still very powerful and useful in practice. Ludwig von Bertalanffy (1968) was the first to suggest that the systems concepts applied in biology could be useful for other fields of research with organized complexity, such as for social sciences. He argued that a system behaves as a whole if changes in every element are depending on all other elements. However, there is a difference in nuance defended by various authors if we take a closer look at this concept in management science. This discussion is used to define a valid and useful position for the field of management science. With this result the basic assumptions of SSM as a holistic approach are compared with the modelling process of the methodology, being root definition, CATWOE and activity model. This document tries to improve our understanding of the problem of particles and wholes within the field of management science and especially of the application in SSM.

WHOLENESS

The concepts of wholeness and decomposition are very much related. Vickers (1983) stressed that although the issue of wholeness appears to be wide and vague it is a powerful concept. A whole can also be a part of another whole or of several other wholes, and a whole can be regarded as a whole for specific purposes. Since we discuss the managerial perspective here we should realize that the elements are not only abstract. Although some elements may be regarded as abstract, such as ideas about strategy or culture, many of the elements under managerial influence are human beings and their products. A factory worker produces continuous quality of the roasted coffee, a consultant gives a financial advice, a bricklayer creates a perfect wall of bricks, an industrial designer improves the functionality and the aesthetics of a coffee machine, and a nurse aims at a quick recovery of the patient in the hospital. Everyday and all over the world managers try to influence the quality of the work delivered by these and other people. In this sense the whole system is composed of constituent parts which may or may not be willing and able to combine in joint action, to act as a 'whole'. Ulrich and Probst defined a system as "a whole made up of parts" (1988: 27). But what is this whole system? and what are its emergent properties?

As many others, Bertanlanffy (1968) refers to the discussion of the whole which is more than the sum of its parts. A part, or defined in systems theory as an element (or particle, constituent), in isolation may be known by a mere description of its properties. Within management science however we would expect many elements and also that these elements have relations. He argued that the emergent properties refer to the characteristics of the elements ánd the relations between them. Therefore, the properties of the complex of elements are labelled 'emergent'.

Flood and Jackson (1991) also defined emergent properties in the light of the classical concept of synergy. They argue that such properties relate to the whole system but are not necessarily present in any of the parts. Emergent properties arise where a complex interconnected network exhibits that 'the whole is greater that the sum of the parts'.

Ulrich and Probst (1988) have a more refined opinion about the concept and argued that the properties of the whole system differ from the properties of the parts, and are more, or something else, than the mere addition of the properties of the parts. They defined a system as "a whole made up of parts" (1988: 27). They argued that the behaviour of a whole system is not the result of the behaviour of one single part, but the result of the combination of all parts.

Vickers (1983) argued that every whole must necessarily be both more ánd less than the sum of its parts; mostly depending on the perspective used. An example. In most organizational changes we could expect resistance to change. In such political situations the sum of the human constituents can be very successful in creating a crisis through a mix of commitment and sabotage. They may oppose to each other, and as such they are something else than the sum of their parts. Not necessarily less than the sum, from the perspective of creating a crisis as a transformation process we would have to conclude that they are much more than any individual could possibly do. However, from the perspective of an organizational change as a transformation process they are less than the sum of their parts: change was not a success.

Checkland (1981, 1990) took another position. He argued that the emergent properties are meaningless in terms of the parts, which make up the whole (Checkland 1981). Later Checkland and Scholes (1990) argued that the emergent properties of the entity as a whole are only meaningful at that level. In other words, Checkland argued that the emergent properties are unique to a certain level, and only exist if there is a lower level in hierarchy. The example given by Checkland and Scholes provides some help in the explanation of this concept. "The vehicular potential of a bicycle is an emergent property of the combined parts of a bicycle when they are assembled in a particular way to make the structured whole" (1990: 19). We are in need of the other parts to assemble the bicycle and in order to be able to cycle. Wilson (1984) agreed with Checkland in arguing that emergent properties are particular to their level of complexity and are meaningless at lower levels. These properties enable us to describe complexity in terms of a hierarchy levels of organization. Each level can be described in terms of its emergent properties.

For our purpose here, the perspectives of Ulrich and Probst (1988) and Vickers (1965, 1983) were followed. It is argued that the properties of the whole are something else than the properties on the lower levels. The perspectives applied is also a matter of importance here. In the example of the bicycle Checkland and Scholes concentrate on a certain purpose of the bicycle: the vehicular potential. It is argued that the properties of a part, e.g. a cycle chain, are unique. It is by no means less than the properties of the bicycle, but depending on the purpose we define. The perspective on the purpose may be changed, for example, into the amoral function of a hooligan to beat someone's brains out in a football riot. Using this (less dignified) perspective, a cycle chain would probably be more effective than a bicycle through its unique combination of size, flexibility and hardness; but all depending on this specific perspective or 'Weltanschauung'. It is the difference between apples and fruit. One could argue that fruit in a fruit cocktail is more than just apples in it. On first sight this appears to be true: fruit will always comprise apples and therefore will be more than apples. This first statement is however only a reality judgement (Vickers 1965) about quantity. It does not involve a value judgement that fruit is better than apples, because that would be a very subjective statement. There might be someone who hates all fruit but apples. From this perspective, any addition of fruit to the apples would worsen the quality of the fruit cocktail. As such the apples do not necessarily need to be meaningless, and the combination of apples and other fruit does not necessarily need to be more than the sum. All we can say is that the properties on each level are unique and may serve a different purpose. For example, an apple to be tasted in one bite will be useful for an advertisement of tooth paste, a property that is not present when all fruits are combined; such will never be a bite.

So in a way it all depends on what we want to do with the system. But it is also evident that a bicycle chain itself will not help us with cycling. We are in need of the other parts to assemble the bicycle and in order to be able to cycle. All elements of this bicycle system have unique properties, not necessarily more or less than the bicycle system. But then again they do form a system: the elements with their unique properties are linked and form a whole, the bicycle system. That is an intriguing contradiction. Since form and function are unique on each level it would be more appropriate to argue that the summation of parts leads to something new and unique. In addition, within a certain perspective chosen one may argue that there are crucial elements and less crucial elements. Let us assume that most bicycles are for 'riding'. From this perspective crucial elements would be a frame, handlebars, wheels, tyres, a chain, etc. Less crucial elements (but very convenient) would be speeds, carrier straps, speedometer, mudguard, windscreen, etc. The judgement about how crucial certain elements are can only be made by introducing a certain functionality or purpose of the system; in our example this was 'riding'. The value of these elements may also be connected with the context in which the system has to perform: speeds may not be necessary in the rather flat Netherlands but are indispensable in Swiss mountains.

It is summarized that the properties of the whole are something else than the properties on the lower levels, they are unique at each level, and the perspective applied is a matter of importance. In this view, the composition of parts leads to something new and unique. The part not necessarily being less or more than the whole or even meaningless. It is also argued that the value of the properties of the system can only be assessed with a purpose of the system. Without purposefulness the systems world of humans cannot be understood. So far the whole system was discussed in a more general systems context. In order to enable a focus on managerial issues SSM is introduced.

SOFT WHOLES IN SSM

Within SSM managers are advised to make models of the complex world around us. These models will improve their understanding of this real world. The softness relates to complexity. Where a tyre is an extreme hard problem, the political situation in Northern Ireland is extremely soft (Wilson 1984). Be reminded that a complex system has special features (Flood and Jackson 1991). Such a system evolves over time, is open to the environment and is subject to behavioural influences. Such a system comprises a large number of elements with not-predetermined properties and a probabilistic behaviour and many loosely organised interactions between them. The sub-systems of a complex system are purposeful and generate their own goals. Therefore complex systems are decomposed into manageable chunks. A guide in the modelling process is the seven-stage model. This meta model was defined by Checkland and separated the real world from systems thinking about the real world. Within the real world, involvement of people in the problem situation is required. Within systems thinking, involvement of people in the problem situation depends on the circumstances of the study (Checkland 1981). The seven stages of SSM can, but do not have to be, used sequentially. Iterations are possible, maybe even advisable since the use of SSM is one of trial and error. In a sequential description the starting point would be the 'Problem situation considered problematic' and the end point the 'Action to improve the problem situation', both in the real world. As such the seven stages of this systems approach should help us to tackle problematic situations in the real world. However, in this paper we concentrate on the modelled world, defined by Checkland as: systems thinking about the real world. The modelled world of SSM is expressed in the 'Root definitions of relevant purposeful activity systems' and 'Conceptual models of the systems (holons) named in the root definitions'. SSM models mostly comprise a rich picture, root definition, CATWOE, and activity models.

As we mentioned above, in our reflection we isolate stage 3 and 4. So, based on the outcome of stage 1 and 2, the clarification of a messy problem situation by a rich picture, we can start to model the real world (one might however as well argue that this picture is more than an overture to the modelling process, but also part of the modelling process itself). Stage 3 is the first step in the modelling process. In this stage Checkland and Scholes described the root definition as: "a system to do X by Y in order to achieve Z" (1990: 36). Normally, the root definition is formulated by considering the elements of CATWOE. They argued that a root definition formulated with attention to the elements of the CATWOE will be rich enough to be modellable. The CATWOE relates to Customers (C), Actors (A), Transformation process (T), Weltanschauung (W), Owners (O), and Environmental constraints (E). The 'customers' are the victims or beneficiaries of T. The 'actors' are those who would do T. The 'transformation process' is the conversion of input to output; T should be related to X of the root definition. The 'Weltanschauung' is the worldview which makes this T meaningful in context. The 'owner(s)' are those who could stop T. Most of the time, the owner is the person which formulates the longer term aim Z. The 'environmental constraints' are the elements outside the system which it takes as given; E visualises the systems border or systems level (1990: 35-36).

In stage 4 we start to construct conceptual models based on the root definition. In the conceptual activity model the minimum necessary activities are assembled in order to meet the requirements of the root definition and CATWOE. In general, they aim to express the main operations and bring about the transformation (in the light of the CATWOE) in a handful of activities. For reasons of practicality we are advised to limit the activities to 7 ± 2 activities. Next, a detailed description of the processes of communication and control is given. In its basic form this sub-system comprises the formulation of the criteria for effectiveness, efficacy and efficiency, a monitor and a control action. With the criterion of effectiveness, it is monitored in what way the longer term aim Z is achieved; 'is the transformation meeting the longer term aim?'. With the criterion of efficacy, it is monitored if the means chosen actually work in producing the output; 'does the means work?'. With the criterion of efficiency, it is monitored whether the transformation is being carried out with a minimum use of resources; 'the amount of output divided by the amount of resources used'. The monitor comprises a detailed description of the monitor activities by using the measures of performance from above. In the control action it is decided whether or not control action is necessary.

In modelling with SSM we have to be sure that the set of activities is linked together in order to make a purposeful whole. SSM is 'systemic' in such a way that activities are described in a holistic way. We have to think in wholes. In connection with this issue Checkland and Scholes (1990) described the essence of systems thinking and related it to 'emergent properties', 'layered structure', and 'processes of communication and control'. These three concepts clarify their meaning of the term 'system'. We mentioned above that they argued that emergent properties refer to the complex whole and which are meaningless in terms of the parts. In addition, they noted that the concept of emergent properties relates to existing layers in a hierarchy called 'layered structure'. "In the biological hierarchy, for example, from atoms to molecules to cells to organs to organism, an observer can describe emergent properties at each layer" (Checkland and Scholes 1990: 19). Furthermore, they argued that "the hierarchically organized whole, having emergent properties, may in principle be able to survive in a changing environment if it has processes of communication and control" (1990: 19). At this point some of the basic principles of SSM are introduced. Now let us start to work with the concept of wholeness by using SSM in a management environment.

WHOLES IN THE MANAGEMENT PRACTICE

Within SSM a manager is advised to think in 'wholes'; some problems may even not be decomposable at all. In this line of thought, it is piquant to mention that the methodology stimulates us to decompose a problem situation into several systems. One could expect complexity to decrease if we come to model the lower systems. Are we still analyzing a complex problem in this situation? Somewhere down in the cascade of systems we cut the complex problem situation down into a simple problem. Let us take a closer look at a complex whole problem such as the world-wide quality in McDonald's restaurants. In the end we would like to have cut it down in order to understand the complexity, such as an exact manual how to clean toilets, draw milkshakes, grill hamburgers, fry potatoes and specifications or French fries (must be cut at nine thirty-seconds of an inch thick) (Ritzer 1996). We loose complexity if we go down the chain of activity models. For many managers working in their daily 'messy' management practice, decomposition is a way to reduce complexity. After all a problem split up into manageable parts will be easier to understand than a complex whole problem. In a managerial context it would however be a tricky, sometimes even impossible problem to reconstitute these parts back to the whole. Do activities around toilets, milkshakes, hamburgers, potatoes and French fries relate to world-wide quality? In addition, by taking the holistic arguments very seriously, we should not have decomposed our first system in the first place. On one hand, in using SSM from that perspective there is a flaw of consistency. On the other hand, it is probably the only way to do it. Moreover, SSM gives some interesting tools to scrutinize wholeness via the links between and within human activity models.

Let us introduce two examples in order to illustrate the problem of particles and wholes. Checkland and Davies described as "one man's 'better' can be another's 'worse'" (1986: 109). In terms of 'purposeful wholes' a manager of a McDonald's restaurant may determine that the activity 'clean toilets' did not link to the other activities. It was not a purposeful whole in relation with the other activities: in her perception these activities all related to a world-wide quality, for example, in order to 'improve the profits' (Z). Also, the other activities did affect the emergent properties of her world-wide quality system (X). She concluded that a part of their system failed, next time she would not perform the activity in the same way. This would affect her future operations. In the bicycle example of Checkland and Scholes (1990: 19) a person would, for example, conclude that a windscreen was not an appropriate part of his whole since his Y consisted of 'feeling the wind' in order to feel free (Z). Here, the manager concluded that clean toilets did not necessarily match with her root definition. In another restaurant the manager argued that the 'clean toilets' activity was linked to the other activities which formed a purposeful whole together for him. This manager expected clean toilets to be a good indicator of the hygiene in the kitchen for the customer (Y) which would attract more customers and consequently would 'improve the profits' (Z) and it worked accordingly. The emergent properties of the system did not change; the bicycle still looked the same so to say. These examples show that value judgements (Vickers 1965) are very important, since it is very hard to judge on facts. Reality cannot be reconstructed. In the above examples it will be hard for anyone to assess if the activity ‘clean toilets’ did or did not affect the aim ‘improve profits’ (Z). Even if the profits did rise no proof was given. Other activities might have been responsible for the increase, the activity may have even harmed the profits, who can tell. In this situation it is hard, probably even impossible, to reconstitute this part back to the whole. Managerial situations cannot be compared to a laboratory where the palette of activities and the environmental influences are under complete control. In some empirical studies similar observations have been made (Mobach 1999a, Mobach *et al.* 1999b). The argumentation will hardly be factual and mostly involve a value judgement.

In another example we take a look at a customer relations project in a hospital clinic for lung diseases and for rheumatism. The two managers were invited by the board to provide information brochures for the patients. Their aim Z was to ‘improve the information for the patients’. The manager of the clinic for lung diseases refused to participate in the project, the other one agreed to participate. The disapproval was related to a detailed issue: the red colour of the brochure. He argued that he disliked the colours. This manager failed however to argue the relevancy in the light of the other activities or the root definition. However, in terms of SSM we could agree with the manager. For example, if the brochure would not be a brochure anymore just by selecting these colours (brochures can only be printed in black on white) or that the function of the brochure, in relation with the other activities and Z, would have been negatively affected in any way (our patients do not read red brochures). In terms of Checkland and Scholes (1990): he experienced that the decided colour of the bicycle was important enough to conclude that bicycle was not a bicycle anymore. The emergent properties of the whole would have been meaningless in this particular colour. We think it is hard to believe that the colour scheme would affect the aim Z ‘improve the information for the patients’. In this situation he would have argued that the colour was vital in order to make the brochure a purposeful whole; for example, that another colour would have a greater attraction on the patient, and consequently more patients would be invited to read the brochure and would be better informed. However, in empirical situations (Mobach 1999a, Mobach *et al.* 1999b) it was shown that managers did not discuss the contribution to Z in such situations. They introduced their personal preference rather than the function in relation with Z. With these examples it becomes clear that the term emergent properties can be used to test the consistency in thought and action for the manager. The concept enables the manager to qualify if the model and according arguments form a purposeful whole.

CONCLUSION

In this paper the concepts of wholeness and emergent properties were discussed. The paper tried to improve the usability of these concepts in practice. It was argued that in the context of a general systems approach the properties of the whole are something else than the properties on the lower levels, they are unique at each level, and the perspective applied is also a matter of importance. It was also argued that the value of the properties of the system could only be assessed with the purpose of a system. It was showed that value judgements (Vickers 1965) are very important, since it is sometimes very hard to judge on facts. Moreover, in managerial situations, also in using SSM, it will be hard, or probably even impossible, to reconstitute parts back to the whole. In such situations, the argumentation will hardly be factual and mostly involve a value judgement. In addition, it became clear that the concept of emergent properties, when applied to the modelling process of SSM, could be used for the purpose of analyses; a test for consistency. As such this test shows whether the links within the human activity system are strong enough to label it as ‘wholes’. The combination of SSM and the concept of wholeness and emergent properties enable a manager to qualify if the model and according arguments form a purposeful whole. It could be argued that these concepts might be helpful to understand reality in its full complexity and stimulate the seeking of accommodations to improve problem situations in the real world.

REFERENCES

Bertalanffy, L. von. (1968). *General System Theory -Foundations, Developments, Applications*, George Braziler, New York.

Checkland, P.B. (1981). *Systems Thinking, Systems Practice*, John Wiley and Sons, Chichester.

Checkland, P.B., Davies, L. (1986). The Use of the Term `Weltanschauung' in Soft Systems Methodology. *Journal of Applied Systems Analysis,* **13**(2), pp. 109-115.

Checkland, P.B., Scholes, J. (1990). *Soft Systems Methodology in Action*, John Wiley and Sons, Chichester.

Flood, R.L., Jackson, M.C. (1991). *Creative Problem Solving –Total Systems Intervention*, John Wiley & Sons,

Chichester.
Mobach, M.P. (1999a). *Thought and Action: Change to the Customer in Community Pharmacy Practice*, Ridderprint, Ridderkerk.
Mobach, M.P., Werf, J.J. van der, Tromp, T.F.J. (1999b). APOM-project: Managing Change to the Customer in Community Pharmacy Practice. *Pharmacy World & Science*, **21**(5), pp. 205-209.
Ritzer, G. (1996). *The McDonaldization of Society*. Pine Forge Press, Thousand Oaks, California.
Ulrich, H., Probst, G.J.B. (1988). *Anleitung zum ganzheitlichen Denken und Handeln –Ein Brevier für Führungskräfte*, Verlag Paul Haupt, Bern.
Vickers, G. (1965). *The art of Judgement –a Study of Policy Making*, Harper & Row Publishers, London.
Vickers, G. (1983). *Human Systems are Different*, Harper & Row Publishers, London.
Wilson, B. (1984). *Systems: Concepts, Methodologies and Applications*, John Wiley & Sons, Chichester.