

Emergence in TQM, a concept analysis

Emergence
in TQM

Everard van Kemenade

*Van Kemenade ACT, Nuenen, The Netherlands and
HU University of Applied Sciences Utrecht, Utrecht, The Netherlands*

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Abstract

Purpose – The question answered in this paper is: what does the concept of emergence mean in the context of total quality management? The purpose of this paper is to develop a definition for emergence by discovering the structure of the phenomenon and to suggest its implications for total quality management.

Design/methodology/approach – The concept analysis follows the method proposed by Walker and Avant (2014). A first step of the method is a general search on the internet and a literature review executed in scientific databases. Due to the limited search results in the field of quality management a support search has been done in three quality management journals and the method of berry picking was added.

Findings – This concept analysis provides attributes of the concept of emergence as well as antecedents and consequences. Emergence is the phenomenon where out of a network of interacting internal and external elements in the course of time arises a coherent new pattern, that is unpredictable, unexpected, unplanned and irreducible to the separate parts. To make emergence happen an organization needs to react to a complex environment that is in un-order far-from-equilibrium. It needs to be (part of) a complex adaptive system. Emergence might rather lead to a (dynamic) bandwidth wherein the result moves, than to a (static) new order.

Research limitations/implications – In the literature review little is found about the consequences of emergence. A hypothesis is formulated in this area that needs further research.

Practical implications – Only as the authors know and agree upon the definition and meaning of the concept of emergence and the characteristics of the Emergence Paradigm the authors can effectively adjust or develop quality management instruments and tools to support or facilitate emergence in complex organizations.

Originality/value – There is a limited amount of literature on systems theory and complexity theory in quality management. Even less on the phenomenon of emergence. There is no concept analysis on the subject of emergence.

Keywords Total quality management, Emergence

Paper type Research paper

1. Introduction

Emergence is a concept that “emerges” in the domain of quality management. Van Kemenade and Hardjono (2019) named one of their four quality paradigms the Emergence Paradigm, a new mindset for quality management next to the Empirical Paradigm of measurement, the Referential Paradigm of models and the Reflective Paradigm of professional reflection. Van Kemenade and Hardjono just roughly describe the Emergence Paradigm. At the same time the authors assure the importance of the Emergence Paradigm for quality management in increasingly complex environments. The question answered in this paper is: what does the concept of emergence mean in the context of total quality management? Purpose of this concept analysis is to clarify emergence, to develop a definition for emergence in the context of total quality management by discovering the structure of the phenomenon. Only then we can define and develop more effectively the way to act, its quality instruments and opportunities.

2. Method

Since the aim of this research is to scientifically define a concept, the method of Walker and Avant (2014) is used. This method is considered to be a very influential way to analyze a concept for scientific purposes (Nuopponen, 2010). Walker and Avant (2014) propose to search many general sources: dictionaries, thesaurus, colleagues and available literature.



“You must consider all uses of the term” (p. 167). The authors divide the task in several steps. Paragraph 3 describes the use of the concept, divided in two substeps: general sources (&3.1) and scientific sources (&3.2). Paragraph 4 describes the attributes of the concept (&4.1), model case (&4.2), antecedents (&4.3) and consequences (&4.4). In a new step that is added to the Walker and Avant-model by the author, the antecedents and consequences are related to the model case (&4.5).

3. Use of the concept of emergence

3.1 General sources

To start the concept analysis keywords “emergent,” “emergence” have been searched in databases Google, visualthesaurus, Wikipedia and online dictionaires. Emergence originates from the Latin verb “emergĕre.” That is composed of “ex” (out) and “mergĕre” (to sink), together meaning evolve, coming to the surface. In seventeenth century, medieval latin the word emergentia was used for an unforeseen happening. The visualthesaurus[1] gives the following description of “to emerge” (Figure 1).

The Oxford Dictionary gives two definitions for the noun emergence. First: the process of coming into existence or prominence. In a sentence: “This and other corroborative facts imply a widespread emergence of land at the close of the Ordovician period.” A synonym would be appearance, arrival and coming out. A second definition close to the first is the process of becoming visible after being concealed. An example is given of an insect crawling out of its cocoon. Synonyms mentioned are: disclosure, becoming known, coming to light, exposure, unfolding, publication, publicizing, publishing and broadcasting[2]. We summarize both meaning of emergence in the word: “to arise” (also see Corning, 2002).

The whole and the some of the parts. There is another definition that is used to describe a variety of phenomena in a variety of scientific disciplines. There, it is not enough when the happening arises. Oxford dictionary gives as one of the meanings of emergent (of a property): “arising as an effect of complex causes and not analysable simply as the [sic.] sum of their effects” (underlining by me). So, the whole is more than the some of its parts. Practically you can see this emergence in such different examples as a flight of starlings, the occurence of a traffic jam, the development of colors, temperature, space and time, in the liquidity of water, in the fractal patrons in snowflakes. Often an ant hill is mentioned as an example of a new pattern that an individual ant could never have achieved. A well known example of emergence is the butterfly effect mentioned by mathematic and metereologist Lorenz. The movement of the wings of a butterfly in Brasil can have an influence on the emergence of a tornado a month later in Texas (In the original text by Lorenz (1963), he spoke about a seagull in a not specified place).

Emergence in this sense stems from philosophy. Aristoteles mentions in Metaphysics Book H 1045a 8–10: “[...] the totality is not, as it were, a mere heap, but the whole is something besides the parts.” However, it can be seen in many scientific disciplines like information

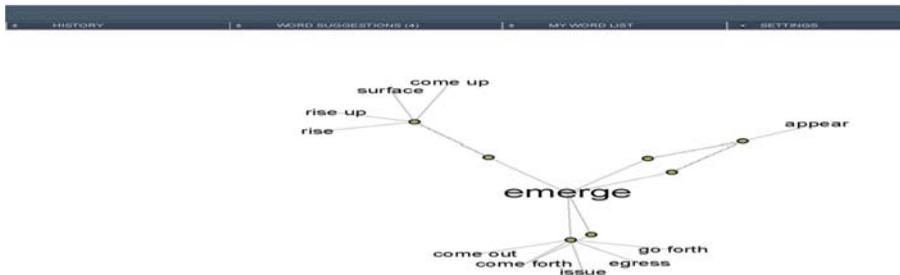


Figure 1.
Visualthesaurus
results for emerge

technology, cybernetics, thermodynamics, economy, language science, biology, chemistry, medicine, mathematics and management sciences. It is used in arts, architecture and religion. In psychology we know the concept of Gestalt. Van Bouwel (2006) states that the idea of emergence is regularly used in sociology as well “to indicate that as a result of the interaction of different parts, something new evolves, that the (complex) whole has properties that cannot be reduced to the parts of which it is composed”(p. 4)[3].

Systems theory and complexity theory. Emergence is a central concept in systems theory. Von Bertalanffy (1968) provides the founding of the general systems theory:

The meaning of the somewhat mystical expression, “the whole is more than the sum of parts” is simply that constitutive characteristics are not explainable from the characteristics of isolated parts. The characteristics of the complex, therefore, compared to those of the elements, appear as “new” or “emergent”. If, however, we know the total of parts contained in a system and the relations between them, the behavior of the system may be derived from the behavior of the parts. We can also say: While we can conceive of a sum as being composed gradually, a system as total of parts with its interrelations has to be conceived of as being composed instantly. (Bertalanffy, 1968, p. 55)

Holman (2010) describes emergence in short as “order arising out of chaos.” Conti (2010) describes the importance of systems theory for quality management. “Life is an emergent property. Intelligence is an emergent property. Love is an emergent property. Organizational excellence too is an emergent property” (Conti, 2010, p. 8). In the 1960s of the last century the interdisciplinary complexity theory developed from systems theory. There complex adaptive systems (CAS) are defined that have properties like self-organization, complexity, interdependence, chaos, self-similarity and emergence. “Emergence is also central to complexity science; indeed, complexity has been described as the study of emergent processes in complex systems” (Lichtenstein, 2000, p. 486). That brings us closer to the scientific notion of emergence.

3.2 Use of the concept: science

To investigate the use of the concept emergence a literature review has been executed. Based on the general search the choice was made to exclude literature on “to emerge” in the meaning of just to arise, since that is not what is meant in the Emergence Paradigm. We choose for the use in systems thinking and CAS, because of its value for organizational development. Table I shows characteristics of the searches.

Supporting search. It appeared that 23 percent of the articles found was related to management science; 20 percent to informatics, 17 percent to psychology. The remaining 40 percent was divided over musical science, environmental science, philosophy, architecture, sociology, healthcare and biology. There was one article found in the field of quality management. Because of the limited output in management sciences a new search is done in three magazines: *TQM Journal*, *TQM* and *Business Excellence Management in the International Journal for Quality and Reliability Management*. Furthermore the “berry picking-method” (Bates, 1989) was used by following references, footnotes, citations, authors mentioned in articles found in the first searches. Those two further activities delivered another 34 articles. That makes the total of studies included in the literature review 64.

4. Findings

According to Walker and Avant (2014) a good concept analysis provides attributes, antecedents and consequences. Attributes are “critical characteristics that help to differentiate one concept from another related concept and clarify its meaning.” One needs to describe which characteristics the concept has and which it has not. Antecedents are “events or incidents that must occur or be in place prior to the occurrence of the concept.” Consequences

Table I.
Searches in scientific
databases

Keyword	Criteria for inclusion	Database	Original search result	Excluded after reading title and abstract	Excluded after reading full article	Results used in the research
Take 1: emergence in title and systems theory in keywords	Free text peer reviewed, English	Academic Search Premier	38	Emerge in meaning of to arise (11); Emergency in stead of emergence (10)	No description or definition of emergence (4)	12 articles
Take 2: emergence in title and systems theory in keywords	Free text peer reviewed, English	Business Search Premier	8	Only abstract available (1); Emerge in meaning of to arise (4); Dubble (1)		3 articles
Take 3: emergence in title	Free text peer reviewed, English	Emerald Group	94	Dubble (4); Emerge in meaning of to arise (65), emergency in stead of emergence (11)	2 no definition of emergence, 4 emerge in meaning of to arise	8 articles
Take 4: emergence in title and complex adaptive systems in keywords	Free text peer reviewed, English	Academic Search Premier	9	Emerge in meaning of to arise (2), emergency (1)		6 articles
Take 5: Emergence in title and complex adaptive systems in keywords	Free text peer reviewed, English	Business Search Premier	1			1 article
Total						30 articles

zijn “events or incidents that occur as a result of the occurrence of the concept – in other words the outcomes of the concept” (definitions in Walker and Avant, 2014, p. 173).

4.1 Attributes of emergence

What it is. There are many different views on the concept of emergence. After Aristoteles, it takes till 1875 until the philosopher Lewes re-introduced and coined the concept. Lewes (1587, reprinted in 2016) stated:

Every resultant is either a sum or a difference of the co-operant forces; their sum, when their directions are the same – their difference, when their directions are contrary. Further, every resultant is clearly traceable in its components, because these are homogeneous and commensurable. It is otherwise with emergents, when, instead of adding measurable motion to measurable motion, or things of one kind to other individuals of their kind, there is a co-operation of things of unlike kinds. The emergent is unlike its components insofar as these are incommensurable, and it cannot be reduced to their sum or their difference. (p. 412)

Thereafter the concept experienced a fast extension toward other disciplines as mentioned in Paragraph 3.1. Many researchers agree –in different wordings – that emergence has got to do with the whole being more than the sum of its parts (Bertalanffy, 1968; Goldstein, 1999; el-Hani and Pereira, 2000; Weick, 2000; Macbeth, 2002; Bunge, 2003; Kurtz and Snowden, 2003; Mitleton-Kelly, 2003; Roux, 2003; Chesters and Welsh, 2005; Graves, 2007; Wolf and Holvoet, 2004; Clayton, 2006; McCarthy *et al.*, 2006; Juriado and Gustafsson, 2007; Kaufman, 2007; Snowden and Boone, 2007; Kim, 2008; Wan, 2011; Schröder, 2014; Ritchey, 2014; Barouch and Ponsignon, 2016; Karimi-Aghdam, 2017; Roundy *et al.*, 2018). Anderson (1972) states:

The ability to reduce everything to simple fundamental laws does not imply the ability to start from those laws and reconstruct the universe [...] At each level of complexity entirely new properties appear. We can now see that the whole becomes not merely more, but very different from the sum of its parts. (p. 395)

Advantage of the choice is that the qualitative aspect is emphasized in stead of the quantitative. In line with these authors preference is given to the qualitative attribute of novelty, emergence leads to new patterns. That is the tipping-point where the structure of the network is changed irreversable. After mixing oil, vinegar and egg suddenly mayonaise is created. The new pattern is coherent (Goldstein, 1999; Wolf and Holvoet, 2004).

What it is not. Emergence can be seen in “what it is not.” Emergence is unpredictable (el-Hani and Pereira, 2000; Gunderson and Holling, 2002; Clayton, 2006; Snowden and Boone, 2007; Kim, 2008; Sawyer, 2005; Ritchey, 2014) and unexpected (Macbeth, 2002; Patel and Ghoneim, 2011). Emergent properties are irreducible to the lower-level phenomena from which they emerge (e.g. el-Hani and Pereira, 2000; Kim, 2008). There is a debate between scientists about the causal influence between the levels (see e.g. Kim, 1992, 2008). Kim (2008) discerns same-level causation, from upward causation and downward causation. Especially, downward causation is not accepted by all. That makes Clayton (2006) express that regarding the causal influence: “much work remains to be done” (p. 4).

Several scientists talk about the unplanned process (Weick, 2000; Juriado and Gustafsson, 2007; Lifvergen *et al.*, 2011). Bratman (1999) claims that human beings are planning agents: “Our [*sic.*] capacities for planning are an all purpose means, basic to our abilities to pursue complex projects, both individual and social” (p. 82). In *Shared Agency* (2014), Bratman seeks to establish a framework for understandable basic forms of sociality. He proposes that a rich account of individual planning agency facilitates the step to these forms of sociality. However, emergence is an unplanned social activity. Lifvergen *et al.* (2011) make a fundamental distinction between planned change and emergent unplanned change (see Table II).

Other related concepts. The concept of synchronicity is coined by Jung (1952/1993). Synchronicity is about “temporally coincident occurrences of acausal events.” That is different from the likelihood of coincidence. Synchronicity and emergence are sometimes considered to be identical (Cambray, 2002). However, in synchronic emergence the emergent phenomena exist at the same time as the phenomena on the lower level they originate from. In the case of synchronic emergence at a certain moment in time novelty revolves around the idea of irreducibility and hence synchronous emergence is usually identified with strong emergence, synchronicity is part of emergence. Some scientists give a more specific meaning to synchronicity than is done here above. Heijblom (2005) adds the characteristic of meaningfulness by saying that synchronicity is about “deemed improbable coincidence of circumstances that one personally experiences as unlikely and meaningful” (p. 23). Jaworski (1998) goes even further. In the preface of his book on synchronicity he states:

We all know these perfect moments, where things come together in an almost unbelievable way, where events that you could never have predicted, let alone steer, lead you in your path in a curious way.

In that case the togetherness of the elements leads by chance to something meaningful, even something perfect. That looks a lot like the new patterns in emergence.

Besides synchronicity “synergy” is associated with emergence. However, synergy “refers to the combined (cooperative) effects that are produced by two or more particles, elements, parts or organisms – effects that are not otherwise attainable” (Corning, 2002, p. 22). The elements, possibly humans, are presented at the same time and at the same time with the result (synchronicity); they cooperate (synergy). Only if, as a result of their interaction, they achieve a new pattern, we call it emergence.

Related also is “serendipity.” In the case of serendipity like in emergence something new evolves, something unexpected, unpredictable. However, it is as it were a by-product.

The discovery takes place, while searching consciously and planned for something else (In that way America was discovered and products like penicillin and viagra were invented by chance).

Finally Noordhoek (2019) distinguishes “surgent” from “emergent.” He used the word “surgent,” from “to surge,” meaning “to rise.” In his research on the quality of associations he agrees that emergence plays a role there. But, he says, sometimes an active element or actor is needed to achieve that result (and then the outcome is no longer unplanned, more predictable and more expected). In most cases he studied some element within the association that put effort in reaching consensus over the concept of quality. In that attribute of an active component surgent differs from emergent, where the new pattern arises more or less spontaneously.

The definitions of these four related S-concepts are summarized in Table III.

To describe the interrelationship of these related concepts and their relation to emergence the following comparison is proposed (see Figure 2).

Planned change	Emergent change
Almost always accompanied by unexpected consequence	The outcome is not the preconceived solution, but the development of the most appropriate solution for the stakeholders concerned
Appropriate for structural changes	Appropriate for cultural changes
Appropriate for economic-based change	Appropriate for organizational capacity building
Appropriate for new organizational structures	Appropriate for change process targeting work processes

Table II.
Planned change vs
emergent change
according to Lifvergen
et al. (2011)

Concept	Definition
Synchronicity	Jung coined the word “synchronicity” in 1952 to describe “temporally coincident occurrences of a causal events”
Synergy	Synergy refers to the combined (cooperative) effects that are produced by two or more particles, elements, parts or organisms – effects that are not otherwise attainable (Corning, 2002, p. 22)
Serendepity	The occurrence and development of events by chance in a happy or beneficial way. (Oxford Dictionary)
Surgent	It is in this respect that the researcher wants to stress the dynamic nature of the theory on the nature of associations and is not fully satisfied to call it emergent. Here and at the end of this chapter the term “surgent” is used. In most cases it will take an effort to get consensus on quality, it must be made to “rise” (Noordhoek, 2019)

Table III.
Definitions of concepts related to emergence

Synchronicity + Interaction = Synergy + Novelty and actor = Surgence
 + Other plans and novelty = Serendepity
 + Novelty and un-planned = Emergence
 + Novelty and perfect = Synchronicity (Jaworski)

Figure 2.
Interrelationship of concepts

Some events occur simultaneously, the actors are present at the same time (synchronicity). They interact, cooperate, what can lead to synergy. Even a new pattern can evolve (novelty). If that process is planned by an actor and achieved through his actions we call it a surgent process. If the new pattern is a coincidence, rather a by-product of other plans, we call it serendipity. If it was not planned, but still evolves, we call it emergence. Some, like Jaworski (1998), use the term synchronicity only when the new pattern that emerged is perfect.

It leads to the following attributes of emergence: interaction, synchronicity, unpredictability, unexpected, unplanned, novelty and irreducibility (as shown in list below).

Attributes of emergence:

- the whole is different than the sum of its parts;
- interaction/synergy between internal and external elements;
- that occur at the same time (synchronicity);
- unpredictable;
- unexpected;
- unplanned;
- leading to new coherent pattern (novelty); and
- irreducible to the separate parts.

The following definition of emergence is proposed: emergence is the phenomenon where out of a network of interacting internal and external elements in the course of time arises a coherent new pattern, that is different from its parts, irreducible to the separate parts unpredictable, unexpected and unplanned.

4.2 Case

Walker and Avant (2014) suggest writing several cases to clarify the concept: a model case, a borderline case, a related case, a contrary case and an illegitimate case. Only the model case on the teaching team Master Integrated Care Design is presented in this article.

The Master Integrated Care Design from the Utrecht University of Applied Sciences started in 2007 as a not government financed course with four students and four part-time teachers. The external developments in the world of work ask for healthcare and social work professionals who are capable to make connections, to design innovative interventions and who can make integrated care happen. Participants in the two-year program exactly develop these competences. The program appeared to be very popular. Since the start the amount of students gradually increased to 133 first year students and 64 second year students in 2018–2019. Since 2017 the master program got its official financing from the Ministry of Education and Sciences in the Netherlands. In 2018, the program is (re-) accredited by the Dutch-Flemish Accreditation Organisation. The growth of the program led to increased pressure on the teachers. They searched in their network within (internal interaction) and outside the university (external interaction) for completion. That caused an exponential growth of the teacher team to 20 staff members. The team that emerged is different than the some of its parts. It is extraordinary in its diversity of gender, ages, experience, scientific discipline. Yet it is very harmonious in a sense that it is new to all members (novelty) and that is not easy to explain. The harmony stays also when new members are asked to join in (synchronicity). Synchronicity can also be noted in the way team members fit in the curriculum. The quality of the cooperation creates continuous learning of the group as a whole and of individuals within (synergy). The new pattern is coherent, was unexpected and unpredictable. It is not the result of planning (unplanned). Some instruments are used to sustain the team coherence (co-teaching, journal club and social events). Result is that the master program is highly appreciated by the students, even now it has grown, as the data of the National Dutch Student Survey (Nationale Studenten Enquete) 2018 show (score 92 on a 100 point scale). The master program takes the shared third place of all masters in the Netherlands as mentioned in the Mastergids.

4.3 Antecedents

Antecedents are “events or incidents that must occur or be in place prior to the occurrence of the concept” (Walker and Avant, 2014).

Emergence occurs as a reaction to the context, the environment. Patel and Ghoneim (2011) state: “Emergence is the apparently sudden and unexpected occurrence of systemic (system-wide) events initiated by the environment that result in a form that is different from the existing form of the system” (Patel and Ghoneim, 2011, p. 425). Also see Bartezzaghi, 1999; Weick, 2000 and Hayes, 2002. Some times it is stated that emergence is a reaction on crises (Holden, 2005; Chaffin and Gunderson, 2016).

Emergence occurs in particular in a complex environment (el-Hani and Pereira, 2000; Mitleton-Kelly, 2003; Snowden and Boone, 2007; Ritchey, 2014). el-Hani and Pereira (2000) state: “When aggregates of material particles attain an appropriate level of organizational complexity, genuinely novel properties emerge in these complex systems” (p. 133). Roux puts it this way: “Technological change is conceptualized as the result of a dynamic and complex process emerging from interactions among properties of the constituting components” (Roux, 2003, p. 11).

Emergence occurs in a context of un-order:

Un-order is not the lack of order, but a different kind of order, one not often considered but just as legitimate in its own way. Here we deliberately use the prefix “un-” not in its standard sense as “opposite of” but in the less common sense of conveying a paradox, connoting two things that are different but in another sense the same. Bram Stoker used this meaning to great effect in 1897 with the word “undead,” which means neither dead nor alive but something similar to both and different from both. (Kurtz and Snowden, 2003, p. 465)

Emergence occurs in a situation of far-from-equilibrium (Cilliers, 1998; MacIntosh and MacLean, 2001; Macbeth, 2002; Chan, 2001):

In 1989, Nicolis and Prigogine showed that when a physical or chemical system is pushed away from equilibrium, it could survive and thrive. If the system remains at equilibrium, it will die. The “far from equilibrium” phenomenon illustrates how systems that are forced to explore their space of possibilities will create different structures and new patterns of relationship. (Chan, 2001, p. 6)

MacIntosh and MacLean (2001) state:

A primary concern of complexity theory is with the emergence of order in so-called complex systems which exists far-from-equilibrium in a irreversible medium. Such order manifests itself through emergent self-organisation which occurs as a limited number of simple order-generating rules operate across a densely interconnected network of interacting elements to selectively amplify certain random events through positive feedback. (p. 4)

Cilliers (1998) tells us, that “Complex adaptive systems operate under conditions far-from-equilibrium, which means there is continual change and response to the constant flow of energy into the system. ‘Equilibrium is another word for death’” (Cilliers, 1998, p. 4).

Øgland (2008) talks about the design of a Quality management System and concludes that “having the organization maintain disequilibrium was a part of the QMS design” (p. 485).

Emergence and complex adaptive systems. The results lead to the question what the relation is between complexity and emergence. Axelrod and Cohen (2000) first define a system, a complex system before taking about CAS: “A system includes one or more populations of agents and all of the strategies that those agents employ. A complex system is one in which the actions of agents are tied very closely to the actions of other agents in the system. When the agents in a system are actively trying to improve themselves (“adapt”), then the system is a Complex Adaptive System.”

Mitleton-Kelly (2003), Snowden and Boone (2007) and Palmberg (2009a, b) consider emergence to be a characteristic of a complex system. The development of emergence here is considered to be the other way around: one of the characteristics of a CAS (Holland, 1998, 1995; Holden, 2005; Clayton, 2006; Lollai, 2017). Holland (1998) defined CAS as “comprised of interacting agents that constantly and mutually affect each other.” Greven (2019) talks about two other important characteristics of complexity thinking: self-organization and emergence. Emergence then is “a situation where out of a certain level of complexity a new [*sic.*] spattern of dynamic arises that cannot be described as the some of the separate parts.” However, most scientists consider interacting agents that constantly and mutually affect each to be a prerequisite, an antecedent of emergence.

Holden (2005) states in her concept analysis of CAS – also using the method of Walker and Avant – that emergence is the most important consequence of a CAS and that complexity is an antecedent of emergence. Also Holland (1992) speaks of CAS and mentions a.o. non-linearity and diversity as characteristics. That supports the idea that CAS are antecedent of emergence, they can “produce” emergence (Lollai, 2017). In the words of Clayton (2006) however, “the difficult part, both empirically and conceptually, is ascertaining when and why the complexity is sufficient to produce the new effects” (p. 4).

A similar chicken and egg causality dilemma occurs regarding self-organization. Domingues *et al.* (2015) study Integrated Management Systems as CAS. One of their conclusions is that self-organization inherently arises from Management System’s integration. Bahskar (1989) defined emergence as the process where the interactions between actors such as co-workers in an organization, lead to development structures that organize these interactions – self-organization. However, most scientists state that emergence occurs when there is self-organization (Goldstein, 1999; MacIntosh and MacLean, 2001; Mitleton-Kelly,

2003; Roux, 2003; Hogenson, 2004; Chesters and Welsh, 2005; Fabac, 2010; Ellis and Herbert, 2011; Oliveira *et al.*, 2011; Karimi-Aghdam, 2017; Lollai, 2017). Mitleton-Kelly (2003):

In an organisational context, self-organisation may be described as the spontaneous coming together of a group to perform a task (or for some other purpose); the group decides what to do, how and when to do it; and no one outside the group directs those activities. (p. 20)

The group has shared intentions (Ellis and Herbert, 2011; Taillard *et al.*, 2016). Building shared intentions (Bratman, 2014; Sawyer, 2005) is part of the emergence process. When actors' intended actions are interdependent they develop shared intentions – that is individual intentions that several actors have in common. Palmberg (2009a, b) talks about a shared vision. Van Kemenade and Hardjono (2019) talk about shared values.

Emergence and the actors. Emergence presupposes non-linearity of the relation between the elements (Macbeth, 2002; McCarthy *et al.*, 2006; Wimsatt, 2008). Macbeth (2002): “Non-linear systems produce the important result that small effects can have unforeseen and unforeseeable outcomes” (p. 728).

Emergence occurs by diversity of the elements or actors strengthens emergence. Emergence is also enhanced by diversity because of the greater interaction and richer patterns (Holden, 2005). Juriado and Gustafsson (2007) state that the emergent communities of practice in their case study emerged by “diversity, the number and the fluidity of the individuals and organisations involved.” Also (2006) mentions diversity.

Emergence occurs if the actors are interdependent (Palmberg, 2009a, b; Ellis and Herbert, 2011; Bratman, 2014).

Emergence is fostered by improvisation. Haenisch (2011):

[T]he term [emergence] points to the characteristics of a collective creativity that cannot be understood in terms of individual accomplishment or ability, but instead as a social practice in which the central authority of artistic authorship is transformed into an aesthetic collaboration, one that is not reducible to a simple “sum” or chain of individual creative contributions, but that brings about an additional value, thus contributing to an improvisation's success (p. 187).

Spann (2018) refers to improvisation and argues how important improvisation is for emergence of quality in organizations.

Emergence and instruments. Macbeth (2002) talks about the need for creative discourse as a means for emergence. Snowden and Boone (2007) call it “dissent and formal debate.” Leaders must create the conditions: “they have to probe, sense and respond” and “Because outcomes are unpredictable in a complex context, leaders need to focus on creating an environment from which good things can emerge, rather than trying to bring about predetermined results and possibly missing opportunities that arise unexpectedly.” Ellis and Herbert (2011) advise management to ensure that lines of communication flow across the network. Fundin *et al.* (2019) stress the importance of creativity. Van Kemenade and Hardjono (2019) prefer to talk about the creative dialogue. Kelly (1994, p. 469) mentions “growth by chunking”:

The only way to make a complex system that works is to begin with a simple system that works. Attempts to instantly install highly complex organization – such as intelligence or a market economy – without growing it, inevitably leads to failure.

Ellis and Herbert (2011) suggest management to apply simple design principles, because they turn into rules. Palmberg (2009a, b) quotes Zimmerman *et al.* (1998, p. 26) who state:

It does show that simple rules – minimum specifications – can lead to complex behaviors. These complex behaviors emerge from the interactions among agents, rather than being imposed upon the CAS by an outside agent or explicit, detailed description.

Below list summarizes the antecedents of emergence.

Antecedents of emergence:

- (1) Reaction on context:
 - Complex environment.
 - Un-order.
 - Far-from-equilibrium.
- (2) Reaction from CAS:
 - Self-organization.
 - Shared values/shared intentions.
 - Visionary leadership.
- (3) Reaction by actors:
 - Non-linearity between the actors.
 - Diverse.
 - Interdependent.
- (4) Reaction through instruments:
 - Improvisation.
 - Communication: informal/through creative discours.
 - Dialogue.
 - Simple rules.

4.4 Consequences

According to Walker and Avant (2014) consequences are “a result or outcome of the concept or phenomenon of interest.” In the literature, little information was found on this topic. Truex and Baskerville (1998) describe emergence in linguistics and states a.o. that emergence does not contain balanced behavior nor any ideal of progress. That is in conflict with the intention of Van Kemenade and Hardjono (2019) regarding the Emergence Paradigm, that is aimed precisely at quality improvement. According to Juriado and Gustafsson (2007) emergent patterns serve as knowledge reservoirs for other parts of the system and contribute to strategic development and innovation. Others like Shiba and Walden (2006) would call it “breakthrough.” Weick and Westley (2002) consider that the result of emergence of learning communities is a “common identity.” Bogenrieder and Nootboom (2002) call that a code, “a highly tacit one, perhaps better called a shared system of meanings.”

Vargo and Akaka (2012) describe the Service-Dominant Logic and its service (eco)system view that considers ecosystems to be emergent dynamic networks of actors and their interactions. A service ecosystem is “a relatively self-contained, self-adjusting system of resource-integrating actors connected by shared institutional arrangements and mutual value creation through service exchange” (Vargo and Lusch, 2016, p. 10). Service ecosystems emerge and are maintained through continuous efforts of individual actors to create value for themselves, and for others, and the value of each interaction is measured at an individual level as well as broader (e.g. meso or macro) systems levels. Individual actors (at the micro-level) actively strive to collaborate with others to create value, and these collaborations may, under the right conditions, allow service ecosystems to emerge across the meso and macro levels and to remain viable. In their view an ecosystem can be the consequence of emergence.

In the case that emergence occurs on the base of un-order, crises, far-from-equilibrium, the question about the consequence of emergence is interesting. Has a new order been established? Vidgen and Wang (2006) mention the development of a steady state. Macbeth (2002) states that that does not have to be the case all the time. And if a new order has been established, this is again very temporary. Again and again the shape and nature of the change needs to be taken into account. Over and over again the antecedents and consequences can be defined: like in the model case. Consequences are presented in list below.

Consequences of emergence:

- common identity;
- innovation, breakthrough;
- bandwidth of equilibrium; and
- service ecosystem.

4.5 Again the model case: teacher team master integrated care design

If we look at the antecedents and consequences the majority can be seen in the model case.

In the world of work of healthcare there was (and probably still is) un-order and far-from-equilibrium, surely when we talk about integrated care. The master program and the development of a team have been a reaction to developments in the context. That is, in terms of Snowden and Boone (2007) a complex environment. The development in the direction of a learning community took place (and still does) by self-organization, no one has ordered that. We can see non-linearity and diversity of the participants. In the development of the learning community continuously improvisation, creative discourses and dialogue have been used frequently. Regarding the consequences the “common identity” or “shared system of meanings” are visible what can be shown by joint and individual ambassadorship for integrated care. After the emergence of the learning community we cannot speak about a new order or balance. The context moves continuously, just as the (members in the) community. This means we should rather talk about a (dynamic) bandwidth, wherein the result moves than about a (static) new order. That idea is supported by researchers that state that CAS develop toward a critical state between order and chaos (e.g. Packard, 1988; Langton, 1992). “Complex Adaptive Systems ‘never get there’. They continue to evolve, and they steadily exhibit new forms of emergent behavior” (Holland, 1992, p. 20). The attributes, antecedents and consequences of emergence are presented together in Figure 3.

5. Discussion

Only as we know and agree upon the definition and meaning of the concept of emergence and the characteristics of the Emergence Paradigm we can effectively adjust or develop quality management instruments and tools to support or facilitate emergence in complex organizations. This concept analysis resulted in attributes and a new definition of the concept of emergence. Insights are given on what precedes. Special attention in that respect is given to CAS, one of the antecedents of emergence. Possible consequences have been presented.

Van Kemenade and Hardjono (2019) make a distinction between four quality paradigms: the Empirical Paradigm, the Reference Paradigm, the Reflective Paradigm and the Emergence Paradigm. The first three paradigms each have their “master brain” that steers quality improvement, being respectively the manager, the customer and the professional (cf. Freidson, 2001). The Emergence Paradigm, however has no one behind the wheel. Emergence is unplanned, unlike what we know from the PDCA-cycle (empirical paradigm) or PDSA-cycle (reference paradigm). The implication of this concept analysis is, that when the context is complex, in un-order, far-from-equilibrium, something else is needed.

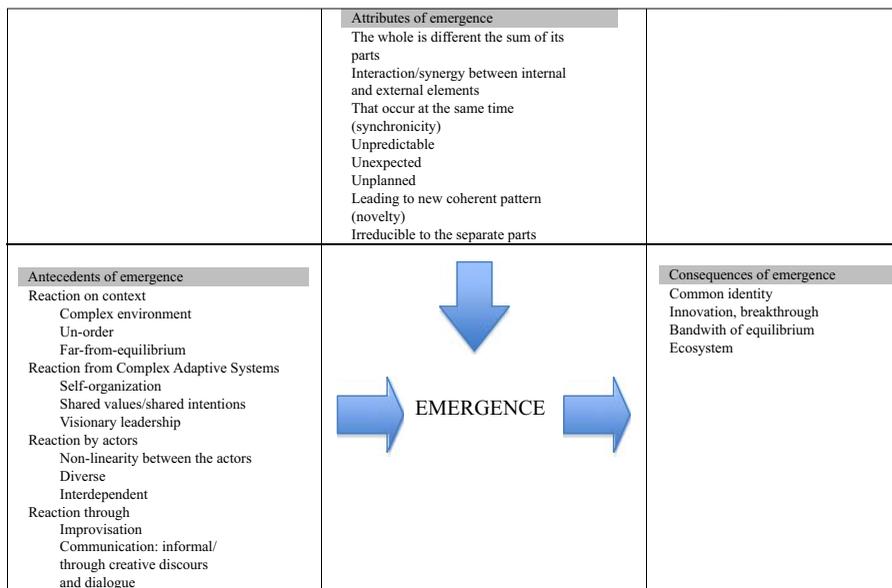


Figure 3.
Antecedents, attributes and consequences of emergence

Lollai (2017) states that Quality Management Systems are preferably handled with “classic” general Systems Theory rather than Complex Adaptive Systems. But:

[...] it should be noted that some elements of the most recent ISO 9001 standard seek to give QMSs an arrangement closer to the more recent complex system approach. Some aspects, in fact, such as a certain peripheral responsibility in managing processes, breakthrough improvements, and enhancing internal competence as a development factor, seem to be an attempt to embrace more recent approaches based on complexity.

Lusch and Vargo (2014) talk about Goods-Dominant (G-D) logic vs Service-Dominant (S-D) Logic. S-D logic considers systematic interaction among multiple actors with varying and changing viewpoints on what constitutes values, that implies a high level of uncertainty. These are called eco-systems. There is a need now for “non-predictive” approaches to market and management. Emergence has the potential to be one of the answers.

When we relate the results of the concept analysis to research done by Van Kemenade and Hardjono (2019) new attributes of emergence have been discovered. Van Kemenade and Hardjono (2019) mentioned in the description of the Emergence Paradigm shared values, “shared leadership,” the use of tools like improvisation, dialogue and appreciative inquiry and the application of principles from systems theory. This concept analysis adds diversity and self-organization of the component parts.

The research did not search for the concept “emergent organisation,” because this concept analysis was looking for the process of emergence not its result. However, new information might have been collected using these search terms.

6. Implications

This research makes further deepening of Emergence Paradigm possible. This deepening is needed because of the complexity of our organizations in an un-ordered context. It is precisely there that the role of leadership and quality managers in the emergence paradigm could lie: supporting organizations to constantly develop and adapt to changing

environments. Do leaders more often need “to let go”? Do quality managers need to bring people together without requesting predefined output? Do quality managers need to gather more narratives than only satisfaction rates and performance indicators?

More research is needed about how we can facilitate the process of emergence. Ellis and Herbert (2011) state that emergent behaviors can coalesce and form informal structures, which may then be readily formalized. Lusch and Vargo (2014) suggest effectuation theory:

Effectuation takes the view that actors operating under [*sic.*] uncertainty cannot predict the future but can take actions that effect it, a step or two at the time. In essence actors are constantly adapting and learning as they go along and making adjustments to actions they can control. (p. 26)

A similar process might lead to emergence.

This concept analysis discovered that in quality improvement activities we can bring people together and foster interaction. We can exchange “who we are, what we know and whom we know” (Lusch and Vargo, 2014, p. 26). We can share intentions and values. We can stimulate creative discourse, dialogue and improvisation. And then – maybe – novelty emerges.

Notes

1. www.visualthesaurus.com
2. <https://en.oxforddictionaries.com/definition/emergence>
3. For a historical overview of emergentism see Brian McLaughlin, “The Rise and Fall of British Emergentism,” and Achim Stephan, “Emergence – A Systematic View on Its Historical Facets,” both in Beckermann, A., Flohr, H. and Kim, J. (1993), *Emergence or Reduction?* Berlin: De Gruyter.

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Corresponding author

Everard van Kemenade can be contacted at: everard.vankemenade@hu.nl

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