

Detecting Amorphous and its Effects during Education at Professional Training Department

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Abstract

Similar to chaos, entropy and anarchy are known phenomenon in industrial engineering and management systems sciences. Dealing with those, also has been studied before. The result of this article emphasizes on responding to those management shortcomings issues, which are not described by entropy, anarchy or chaos theories. Amorphous, however, duly addresses those shortcomings. A process running in the amorphous might result in an output, which is different from that originally envisaged by the system. In such a case, the output cannot be categorized within entropy, anarchy or chaos theories because the output, despite being other than what was expected would be a useful and practical in nature.

This paper shows how this new phenomenon was studied in training departments of professional organizations after training. Therefore, how amorphous can be identified taking into consideration the final evaluations of trainees and how, through managing the amorphous output, the training processes and outputs can be turned to useful outcome.

The results of the present research express different standpoints organizations take in treating and managing effects of amorphous phenomena in education.

It is hoped that the current work be the beginning of the forward and positive stream toward recognition and managing this new issue and be a help to industrial engineering and management Systems sciences.

Keywords

Amorphous, Chaos, Anarchy, Entropy, Training

1. Literature review:

The theory of anarchy explains a mathematical phenomenon which studies the behaviour of dynamic systems that are deeply sensitive to their first conditions [1] and inside them we can't point to any specific rules. Theories like butterfly effect which is a metaphor of a beginning of a storm that the cause of it is a butterfly flapping in faraway [2]. Bullwhip effect theory also point to this [3].

Although there is no special formulization for this phenomenon, what are mentioned to be used in dynamic systems, are sensitivity to the primary conditions of the system and complexity of that. Anarchy in simple words can indicate the lacking of rules and laws.

The theory of entropy is inspired by the laws of nature like other meta-heuristic theories. Entropy theory in general means that there is a specific rule or law to do the works and processes, but by any reason they are not followed [4]. This issue is precisely like the entropy between atoms in physics. In fact, there is a law to keep atoms together but sometimes rules are not persuading by them [5].

The theory of chaos (Order within disorder); It is a modern and advanced model to understanding the problems and complicated events. Therefore, this theory is a tool for recognizing and describing with complexity and blurs and hidden connections in industry. The most essential and dangerous part of today's managers job, in very disturbed and more confused way rather than the clear and obvious duties, is to overcome the changes and instabilities which come from the organizational disturbance. Lives of ants, bees or crossing people on streets are instances for the chaos theory. The meaning of this theory is that although the activities of people in organizations are done in different ways and manners, all these activities rest in discipline chasing the main target of the organization. Other complex systems' manners and duties are also followed by this foundation [6].

Amorphous, also is the event that takes place in nature. When the temperature of liquid metal is reduced enough under the freezing point, in different areas of the liquid gradually primary gatherings of atoms and cores are organized. At this time those cores, which are solid, act as the center for more crystallization of the liquid. By reducing more degrees, more atoms become solid, which are possible for them to independently change into cores or added to other cores. Each core by absorbing more atoms to its crystal will grow. This growth continues in three directions. Atoms stick together in special directions, which are mostly the crystal axis [7]. This type of growth gives a shape to the crystal, which is like a tree and is called dendrite or branches shape. Regarding to the fact that each core is shaped accidentally, the axes are in disorder towards each other and dendrites are grown in different ways. Gradually by the continues of freezing, the amount of liquid is decreased and the spaces between branches are filled. By reaching two adjacent dendrites and filling the space between them, their growth is stopped. This causes the solid metal has a very disordered inner shape. Crystals in metal are generally called beans and the regions, which divide those beans, are called bean boundaries. At boundaries, atoms have disordered situations and as a result these parts do not have crystal construction and they are amorphous [7].

2. Amorphous:

In general, amorphous exists like entropy, and for measuring it, it must be told comparative. With the meaning that how much amorphous in time t_1 is more or less than time t_2 . In physics science, Amorphous exists for sure. The reason, on the freezing time, definitely more than one crystal being shaped. However, the moment, which is very cold, and in fact, change of temperature is sudden and the number of primary crystals which are the cores will be a lot because of the sudden change. Available molecules did not have the time to stick to the core and changed themselves to a core for making a new formation. Because of that there are lots of crystals with different directions and this happens because of the number of crystals without network integrity (Amorphous). Generally, this event makes the situations in which a substance is changed to a different substance after going into a process. Although the output of this process is different from the expected output, it is also acceptable and useful, even if not useable for the thing we planned for [8].

With this inspiration from nature, a phenomenon in management is exposed, it means in a management system a process is set and expected to have an output like what is planned formerly. However, it will not be like that. Again, the output of the process is still desirable which can be used in different ways.

In addition, it must be mentioned that it is undeniable that there are always some parameters, which are hidden and not discovered before any procedure, but they are always effectible under stress or pressure. These kind of stress which are applied because of any condition like environment or a training course, can change the process result to a different useful result.

There are three features appointed to Amorphous:

- Ambiguity
- Complexity
- Uncertainty.

All of the three plus instability are the features for future study structure. However, stability is within the Amorphous. In Amorphous, it is clear, the outputs, which are going to be used in other ways, should have a stable manner and in its new form should be usability.

3. Amorphous in teaching and training:

The assumption is all the human resource, fresh and old employees will go under organization's trainings to fit for different positions.

	Job 1	Job 2	Job 3
Person A	1	0	0
Person B	0	1	0
Person C	0	0	1

Figure 1: matrix of the assumption of the problem

Figure 1 shows that person A will be trained for job 1, person B for job 2 and person C for job 3. The training process, like other processes, depend on conditions would be influenced by different situation. Therefore, the process output is not the same as expected. As a result, evaluation result for training looks like followings in Figure 2.

	Job 1	Job 2	Job 3
Person A	0	0	1
Person B	1	0	0
Person C	0	1	0

Figure 2: matrix of the result of the problem after passing the training process

Now as human resources (person A, B, and C) were planned to be allocated to jobs 1, 2 and 3, Jobs 1, 2 and 3 are respectively for people A, B and C, and to this plan the training process was established, so there must be something unusual. Can we say this thing is an anarchy and try to provide a solution for it by the theory of anarchy? The answer is "NO". as it is told before, in anarchy theory it is told that the system has no rules and just a parameters even a very small one can have a very big affect on the whole system. But here we see that a training process was programmed; so this is not anarchy, so we can assess it by this method. Next question is this; can we evaluate it by entropy? As we understood that all the people participated in the courses finished it completely according to the plan so we can't say it can be analysed by entropy theory. How about chaos? Again no! it is correct that the result of the process is not what expected but still they can work in the system and can be useful. So there must be something other than these theory and it is called amorphous because this result is not what process were trying to gain and this output that the system provides, is not the thing that it was expecting or it was defined for it, but yet the current output is useable for system. For making it clearer, notice the following instance;

In a workshop there are three kinds of positions for three groups of people. suppose that each group contains 25 people whom by any reasons (which can be previous experiences or perhaps their own sensible interests) are chosen to be in the groups A, B, and C and be trained respectively for departments 1, 2, and 3. This is set that these three groups, who are the resources of the problem, after passing instructions in 4 sections, will be used for the three department. The placement is like that each person for department 1 needs 50% knowledge of skill S1, 60% of skill S2, 20% of skill S3, and 90% of skill S4. For the second position or department a group requires at least 30% knowledge of skill S1, 30% of skill S2, 100% of skill S3, and 30% of skill S4. And for department 4 a group needs at least 40% knowledge of skill S1, 20% of skill S2, 70% of skill S3, and 60% of skill S4. On the other hand according to some reasons (which can be the previous positions or former skills or knowledge of each group) it is decided that group A is set for department 1, group B for department 2, and group C for department 3. Accordingly Figure 3 is true.

	Skill S1	Skill S2	Skill S3	Skill S4
department 1	0.5	0.6	0.2	0.9
department 2	0.3	0.3	1	0.3
department 3	0.4	0.2	0.7	0.6

Figure 3: the matrix of minimum of requested from the training process for entrance of each department

According to the problem hypothesis we can get the result that the following Figure 4 is valid.

	Skill S1	Skill S2	Skill S3	Skill S4
group A	0.5	0.6	0.2	0.9
group B	0.3	0.3	1	0.3
group C	0.4	0.2	0.7	0.6

Figure 4: the matrix of minimum of requested from the training process for entrance of each group

Amorphous: The installed process is planned to have the 3 groups get the least skill for each expected position, after passing the courses on 4 skills. Training process is like this; there would be 4 courses in the 4 skills for each group. According to that the condition of teaching is related to different factors, the final evaluation in these 4 skills will give the following result; Figure 5. As it is seen there is something unseen in the courses that couldn't validate the expected result. Something unexpectedly changed the interests or the nature of employees in groups.

	Skill S1	Skill S2	Skill S3	Skill S4
group A	0.3	0.4	1	0.5
group B	0.5	0.6	0.7	0.7
group C	0.5	0.9	0.9	0.5

Figure 5: the matrix of the result of the training process

The thing which is happened here, is called Amorphous. It means that a process is done, but the result is not the same as what was expected. Thus, the result is not useless yet. Although the essence of output is not the same as the expected one from the system, the material can be used in another way usefully. On the other side, the stability exist clearly in this case, because the groups participated in this process have the specific output result and if after placement in their proper positions they don't progress, they either don't regress. This means that the group who was set to become a technician for department 1, has become an operator who is suitable for department 2. According to the problem the output will be like Figure 6.

	Job 1	Job 2	Job 3
group A	0	1	0
group B	0	0	1
group C	1	0	0

Figure 6: the matrix of the result analyzed

According to the Amorphous, there are two points available:

- Recognition of Amorphous gives the chance that in different ways, we review the teaching process and evaluate it in order to reach the set goals in the system.
- After recognition of Amorphous, we manage the output in order to use the most of it in the system.

It seems that by recognizing the amorphous in this case, we could consider the correction of process and available system, besides we could think of managing it and utilization of it.

What is clear in organization entropy there is lack of obeying rules. The rules which are set in any way for any reason, but are not followed.

In anarchy the problem is a bit different and the negative point is that there is no rule at all. This means that there is no specific rule for the system to follow and reach its goals.

But in amorphous there are rules and law (so this is different from anarchy) and also there is obeying the law (so this is not entropy either).

Matrix management:

In organizations in which the management technique is matrix-like and one section simultaneously follows two or more managers; because there are possible distinctions inside that organization, amorphous may occur. This is possible that the first management section sets some rules which are against rules from the second section. As a result, the probability of Amorphous exists.

4. Conclusion:

What can be extracted from this research are how to recognize the disfigurement in instruction process and after that how to act with that. Therefore, if this event is recognized, it seems that the best way and the cheapest condition for the organization is to interact with the problem; so in this way without any reforming, the output can be used in some way. Using this viewpoint if we see some situations that some groups are accidentally entered department vacancies, we will be able to manage them. Then for the future investigations it is recommended that after understanding this event in system and working on the output, review and corrects the process and gives some solutions for that.

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