



## **An understanding of psychology to enhance organizational strength**

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# **An Understanding of Psychology to Enhance Organizational Strength**

**Abstract** – Any given organization has separate entities and subsystems that work independently for a common goal. However, these entities and subsystems do not always function collectively. There is often lack of communication between entities and subsystems within organizations due to rigidity of organizational structures. This lack of information flow translates into numerous discrepancies within the organization which include a lack of a sense of belonging, motivation, efficiency, innovation, creativity and adaptation to the environmental trends. In this paper, the authors will make use of psychology and the notion which assumes that more complex organisms will develop more complex means of communication and conversely the simpler organisms with the simpler nervous system will develop simpler means of communication. Thus, the authors will use the analogy between organizations and organisms and hypothesize that having a well developed communications network is just like having a complex neural mechanism. When the authors draw parallels between a living organism and an organization, it becomes evident that it is pertinent for the organizations to adopt an organizational culture that will foster well-developed means of communication, strive for development as well as flexibility in order to adapt well to the environmental trends. In both instances one could gain a comparative advantage in adaptation to environmental trends such as market trends competitors, technological developments, economic climate etc. that are crucial for the success of an organization. The authors will use the above logic to explain to engineering managers the need to incorporate more psychological concepts into the EM curriculum so as to understand how to better the organization as an entity and to improve its organizational strength.

## **Introduction**

A quote by John Reinert, an engineering manager at Aeroflux Microelectronics in Colorado Springs, CO states, “The soft skills are just as important the engineering skills.” This statement has been proven to be true for companies of all sizes, particularly for small startups, which employ a large percentage of engineers who graduate from various schools. This is because at a small startup company that is trying to make in-roads into a new market, using these soft skills are extremely important. The technical skills are the defining skills and the soft skills are the enabling skills. These soft skills include: Oral and written presentation skills, ethics, interpersonal skills, understanding globalization, how to function on teams as well as understanding how psychological theories affect the running of an organization and also affect organizational strength. This is even more applicable today since in the 21<sup>st</sup> century, the engineer is not doing his/her traditional technical role, but instead plays the role of an entrepreneurial/enterprising engineer. The entrepreneurial engineer does not just innovate, but has to play a role in the actual realization of the innovation, which would not be possible without using soft skills.

However, the challenge we face today is that not many engineers as well as engineering managers see the relationship of engineering to psychology [16]. In this paper, the authors have

discussed various psychological theories that affect the workplace and think engineering managers should be aware of in order to enhance organizational strength. The authors go on to explain that these concepts should be included in the engineering management curriculum to enable engineering managers to manage their organizations more effectively. In fact, the American Psychological Association has stated that Psychology should be considered as a core STEM discipline because technology requires the use of human operators, and understanding human capacities and limits is essential for implementing technological advances [17]. Along those lines, the field of engineering psychology has experienced massive growth because there are many opportunities to conduct research in the area of interaction between people and machines, tasks and environments [18] – both of which are interactions that are necessary for engineering managers to understand in order to manage projects successfully.

### **Psychological Theories that affect the workplace**

The mechanistic paradigm originated during the Scientific Revolution and dominated the scientific realm up until the mid 20<sup>th</sup> century [5]. According to the mechanistic approach, the universe, people and other entities are complex mechanisms and are best understood through the mechanistic perspective. Initially, the management of human capital within the organizational settings was also purely mechanistic. The 18<sup>th</sup> century philosopher and a political economist Adam Smith was one of the proponents of the earliest organizational theory; the classical organizational theory [6]. In his book the *Wealth of Nations* (1776), Adam Smith stresses that the fundamental method to attain efficiency underlies in the division of labor. In the early 20<sup>th</sup> century, this idea was adopted and applied to the manufacturing processes of Ford Motor Company, where it had found its fullest application in the form of assembly line manufacturing processes [11]. The assembly line production process transforms the work processes into chunks of automatic, standardized tasks. In the early 19<sup>th</sup> century Max Weber developed the concept of bureaucratic organization, which is the backbone of the classical theory [Holbeche, 6; Levy, 7]. The key characteristics of bureaucratic organization are division of labor, standardization of tasks, delegation of authority, span of control and centralized decision making – all of which can help enhance organizational strength, if implemented correctly. Shortly after Weber, an American mechanical engineer named Fredrick Taylor founded the study of scientific management. As the name suggests, Taylor used scientific methodology to systematically examine organizational work processes and improve them. He was one of the first scientists to note a correlation between working conditions and workplace efficiency [3]. Akin to his predecessors, Taylor had a mechanistic approach towards organizational efficiency. He believed that the best method to maximize efficiency is to divide tasks into chunks and have the workers perform standardized, mechanical work [7].

At the time, the division and standardization of tasks worked well. Due to the lack of automation, the production processes were almost entirely dependent on manual labor. Thus, the mechanistic strategy made sense for the implementation of non-cognitive and routine tasks. Furthermore, in the early 19<sup>th</sup> century, most organizational theories were proposed by economists, sociologists and engineers [7]. Thus, it is no wonder why the organizational theories of the period have a mechanistic approach. Naturally, there was a need for a humanistic perspective in the study of organizational functionality. This need was first recognized as a result of series experiments known as the Hawthorne studies. The essential aim of these studies was to

examine the impact of illumination on productivity. Instead, the Hawthorne studies highlighted the attitudinal changes that occurred as a result of the presence of the experimenter. The studies emphasized the correlation between the employees' social and psychological needs and productivity. This discovery began the application of psychological concepts and theories within organizations [7].

In the 20<sup>th</sup> century, the human management strategic process had undergone significant improvements. This upward trend was not only due to the origin and development of the industrial and organizational psychology but it was also due to the overall progression of the psychological sciences. Theories and concepts from many other branches of psychology including behavioral psychology, humanistic psychology, social psychology and cognitive psychology had grand contributions to the understanding of organizational behavior.

Lillian Gilbreth, who was one of the pioneers in industrial psychology, argued that workers are motivated by both: 'indirect incentives' (i.e. tangible rewards such as money) as well as 'direct incentives' (i.e. intangible rewards such as job satisfaction) [Gavin, Clamar, & Siderits, 2; Levy, 7]. Gilbreth was a grand believer in an intrinsic causation of motivation and she was very critical of Taylor's disregard for worker's intrinsic needs. The contemporary version of Gilbreth's philosophy is the job characteristic theory, which attests that motivation is determined by a match between individual differences in personality and characteristics of the job. Gilbreth had a very humanistic approach to understanding organizational behavior. She was one of the first business experts to acknowledge the effects of stress and sleep deprivation on job efficiency [Gavin, Clamar, & Siderits, 2; Levy, 7].

From the mid 20<sup>th</sup> century onward, the mechanistic paradigm was becoming inadequate. As a result, the scientific paradigm shifted from mechanistic to organic in all the sciences. Psychologists were noticing that people have an intrinsic strive to evolve and adopt. It was becoming clear that there is more complexity to behavior than just external, deterministic causation. In the second half of the 20<sup>th</sup> century, psychologists were adopting a more holistic approach to human existence. Much emphasis was now placed on human potential, free will, self-actualization, and creativity. An American psychologist Carl R. Rogers, who was one of the founders of humanistic psychology, proposed a person-centered approach to psychotherapy [4]. This change of paradigm in psychology also caused a switch from the classical organizational theories to the humanistic ones. Organizational leaders could no longer afford to ignore the social and psychological needs of employees; not meeting these needs caused inefficiency.

From the concepts of humanistic psychology, Abraham Maslow postulated a theory of motivation. His theory assumes that people's actions stem from the desire to satisfy their biological and psychological needs. At the top of Maslow's hierarchy of needs is the need for self-actualization, which is the need to fulfill an inherent drive to reach one's full potential. That is, according to Maslow and Rogers, the individual's self-improvement is believed to stem from an inherent motive rather than from some external stimulus. Since Maslow, there have been many theories of motivation proposed such as Alderfer's ERG theory, Herzbergs two factor theory, job characteristics theory, cognitive choice theories, etc. that followed suite and emphasized the importance of considering the psychological factors underlying the human aspect within the organizations [Levy, 7; Deckers, 1].

Moreover, a lot of work has been done in the areas of leadership, cognitive ability testing, personality testing, organizational psychological health, work attitudes, etc. That is, the researchers have realized that the organizational efficiency not only depends on the organizational structures but also on the psychological factors underlying the employees' attitudes towards work and their psychological health [7].

Furthermore, there was a switch in leadership style from rigid, centralized and formal to more flexible, contingent, and collaborative. As a consequence of the impact of psychological sciences on the organizational settings, it soon became evident that the organizational health greatly depended on the health of all of its constituents – starting from the top of the pyramid to the bottom. That is, it was understood that psychological factors underlying work in all hierarchical levels needed to be scrutinized. For instance: the leadership theories such as Theory Y and Theory X and LMX theory, underline the possible biases that might influence the leader's decision making, which in turn can impact worker's self-efficacy [7].

Moreover, important advancements have been made in the employee selection processes. The researchers have started to question the old methods of ensuring the quality of outputs by controlling the quality of inputs. Specifically, I/O psychologists have been questioning the validity of cognitive ability tests such as Raven IQ tests and the validity and relevance of the personality tests such as Big Five Personality test. These advancements ensure work efficiency and quality control of new engineering hires by making the employment selection processes more accurate and thus in turn providing more productive employees and a lower turnover rate, which is necessary for better performance [7].

In addition to these advancements in organizational theories, in 1979 Daniel Katz and Robert D Kahn proposed the open-system theory. According to this theory, organizations have functional similarity with all living things in that they have a give and take interaction with the environment in which they exist [7]. Shortly after, Gareth Morgan proposed the concept of “organizations as organisms” and instigated a change of perspective in the organizational functionality and development [9]. Both of these notions are based on the principles of biology, comparative psychology, and social psychology. The underlying assumption is that the complexity of organisms' neural system determines the communicability and adaptability of the organism. Thus the organism with a more complex system is at an advantage within its environment.

Despite the progress in organizational development, the scientific paradigm shift from mechanistic to organismic was a gradual one. Even now, some aspects of the mechanistic paradigm are still used in the science, although it is not the dominant approach. For example, current methodologies aimed at enhancing performance and motivation is mostly based on the reinforcement theory. However, this approach is currently being challenged by many scholars such as Dan H. Pink, who stresses on TED talk that a number of studies had found monetary rewards to be an ineffective motivator. Pink exemplifies a number of studies amongst which a study conducted at MIT, which had found that monetary rewards are only effective if the task is mechanistic. That is, if the task requires even basic cognitive skills higher monetary rewards have a negative effect on performance. Dan H. Pink argues that humans are not as easily

manipulable and predictable as previously believed [10]. This new notion contradicts the currently accepted norms in economics as well as in scientific management. Today, most organizations motivate creative, knowledge workers through monetary incentives, which have shown to be counterproductive.

### **Reasons for introducing psychology into the engineering management curriculum**

#### ***Rapid technological changes and dynamic business environment necessitate organismic approach for organizations and a keen understanding of human factor for managers***

Technological advancements in production processes led to changes in the roles of many employees. Most of the production processes have become automated so there are few routine or mechanical tasks performed by employees. This shift from mechanical to cognitive or non-standardized tasks was one of the main factors leading to widespread application of psychological sciences in organizations. The classical sequential and rigidly planned organizational strategies were no longer adequate. One reason for the inadequacy is that these rigid organizational structures render a one-sided flow of information. This limits creative input from the lower structural levels. Poor flow of information prevents efficiency in a rapidly changing environment. Thus, there was a need for more flexible and adoptable strategies.

In order to gain comparative advantage, the organizational leaders must develop strong internal organizational resources and capabilities and match them with the environmental opportunities. In contrast to internal resources such as raw materials, machinery, etc., organizational capabilities such as employee knowledge and strategic management aren't as easily imitable and substitutable. Thus, emphasis needs to be placed on the intangible asset of the organization - its knowledge base. Research shows that the best way to acquire and maintain strong knowledgeable employees is to promote a learning and adoptive organizational culture. Moreover, an organization must maintain its comparative advantage after acquiring it. The best way to maintain an effective workforce is to promote self-efficacy and motivation among employees. In order to attain these objectives, organizational leaders need to abandon the mechanistic approach to organizational processes and adopt an organismic one. With the evolution of the markets, organizations have to evolve as well.

The competitive environment changes rapidly in most of today's industries. Organizations have to be more adoptive and responsive to market needs. To achieve this, organizations need to be viewed as organismic entities, the health of which depends on its constituents. That is, the health of the organization depends on the physical and psychological wellbeing of the employees. Maslow shows that in order to tap into the employees' strive to self-actualize; the organization must first attend to the physiological, social and psychological needs of the employees. According to job characteristics theory, individuals are motivated if the task is significant, requires a variety of skills and the employees identify with the task. Additionally, the employees feel motivated and self-efficient if they have sense of autonomy in their workplace and they systematically receive feedback from their managers. If the employees are treated as a part of the organization and not merely as organizational tools, they become more motivated, responsible and self-efficient. Consequently, this approach will ameliorate counter-productive behaviors such as absenteeism, stealing, etc.

Furthermore, organizational leaders must control for work-related stress by promoting healthy interpersonal relationships and less demanding work schedules. A constantly stressful environment will wear down employees and result in long term performance problems. Additionally, a stressful and demanding work environment often renders the employees sleep-deprived, which also results in unfavorable consequences. Moreover, stressful working conditions might even result in disastrous consequences that can be very costly for organizations. For example, the overly demanding and stressful working conditions at the Foxconn iPhone factories in Beijing drove fourteen workers to commit suicide. This resulted in a big scandal and eventually in a pay raise for the 1.1 million Foxconn employees. Aside from the human tragedy, Foxconn and Apple both felt the impact through decreased profits and negative publicity [8].

Lastly, it is important to detect emergent strategies, opportunities and environmental trends. The detection of these proceedings will not only render the firm capable to react to them but also to proactively create them. Cognitive psychologists believe that people attend to stimuli more quickly if they have been previously exposed to or have preconceptions about the stimuli. From this notion it can be hypothesized that organizations that embrace knowledge sharing environment are priming their employees to detect and attend to new environmental trends and opportunities. As a result, these organizations will gain an advantage. Thus, the organizations must develop a strong communication network. This in turn will translate into organizational adoptability.

### ***Differing Organizational Cultures in the global economy***

It is important for today's engineering managers to understand that in today's global operational field, organizational culture must recognize cultural diversity. Engineering managers also need to recognize the many types of cultures that exist within an organization [13]. Hence, engineering managers need to keep in mind that social norms of countries will cause employees to deal with similar situations differently. Thus, engineering managers should be sensitive to global differences in approaches to solving problems [12].

The important thing for engineering management educators to do is to include these topics in the engineering management curriculum so that when students graduate and become practicing engineering managers, they can look at these cultural differences as an opportunity which could give them a competitive advantage instead of thinking of it as a challenge as we all tend to.

### ***Implications for engineering managers not understanding the psychological aspects of employees and differing cultures within their organizations***

In the few cases when engineering managers deal with projects without an international flair, they have to deal with conflicting personalities of team members as well as with team members who might not be pulling their weight on the team. However, cultural differences could cause additional misunderstandings and tensions within the team. Figure 1 shows the various values that can have impacts on projects, particularly when dealing with varying cultures [14]. It is important for engineering managers to understand differences in values that people have,





students. This is because it helps the students adopt a contingency approach when they go out into the workforce and become practicing engineering managers.

### **Conclusion and Future Implementation**

Due to the changing needs of industry, the current engineering management curriculum needs to be updated. However, most academic institutions take a while to implement changes and are currently not keeping up with the changes needed by industry to produce graduates that can better manage complex projects. Engineering management programs have started addressing these changes by introducing courses in organizational behavior but still fail to address the psychological factors that should be understood by engineering managers in order to run a high tech organization more effectively. The authors have thus discussed in this paper about which topics they think should be included in the engineering management curriculum and also the various cultural values that engineering managers should be aware of so that their projects are not adversely affected. This is necessary for engineering managers because understanding the nuances of high tech projects is merely the half of the task. The engineering managers also need to have a profound understanding about the human factor, which is crucial to the implementation of the project and project management. The organizational leaders have already realized this actuality, which is why they place grand emphasis on hiring individuals with great interpersonal skills. Moreover, organizations have already adopted organismic paradigm as a key factor to survival in today's dynamic business environment. Employees are no longer thought of as commodities rather they are thought of as an integral part of the organizations, the well being of which depends on the well being of the employees. Thus today's graduates need to not only understand the structural aspects of project management, but also they need to have the knowledge base that will render them capable of managing their subordinates, who constitutes a critical factor in project management and implementation.

As part of future work, the authors are surveying and interviewing students in business programs as well as in engineering management programs to see if they have any exposure to understanding the effects of psychology and how that could help them or has helped them in their jobs.

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