# MANAGERIAL SKILLS REQUIRED FOR INDUSTRY 4.0 REVOLUTION

**Akshay Arora, Vaishali & Mohit Jain**
Management Student, Asian Business School

**Abstract:**
Industry 4.0 is characterized by smart manufacturing, implementation of Cyber Physical Systems (CPS) for production. The high-tech manufacturing environment will need both skilled managerial and production labor with expertise. The demand for special skills will drive the shift of job creation requiring more qualified managers and highly differentiated customized products and services, value added services including an efficient supply chain. All this requires continuous innovation and learning which depends on an enterprise's capabilities. Also, these include competencies like creativity, critical thinking, communication, strategic thinking, and problem solving to find and develop creative solutions for the complex world we live in. This paper aims at analyzing a viewpoint on the best suitable management practices which can promote the climate of innovation and learning in the organization, and hence facilitates the business to match the pace of Industry 4.0. Management approaches can play a vital role in the development of dynamic capabilities. It draws the attention towards the important role of management practices in Industry 4.0. Our aim is to look for the skills/competencies needed by contemporary managers to cope with new challenges of Industry 4.0? However our research is based on the use of peripheral information from different sources available to general use via internet platform and understanding of the authors of this paper, but with detailed study and analysis we have come to a common conclusion which includes the adaptation and need of upskilling the methodologies at all levels to be in sync with Industrial Revolution.

**Keywords:** Management Practices, Entrepreneurial Thinking, Analytical Skills, Innovation, Adaptability, etc.

## Introduction

Fourth Industrial Revolution/ Industry 4.0 is marked by lightning speed advancements and mind-boggling changes bringing together digital, physical and technological advancements and thus is highly unpredictable. Enterprises have to react quickly to opportunities and challenges of the business world. It describes the increasing digitalization of the entire value chain and the resulting interconnection of people, objects and systems through real time data exchange. In-spite of enormous progress in industry managers constantly need to face new challenges. The term Industry 4.0 is often referred to as the fourth industrial revolution. The concept of this Industrial Revolution describes the increasing digitalization of the entire value chain and the resulting interconnection of people, objects and systems through real time data exchange. This creates many new opportunities for companies, but at the same time several upcoming challenges from the ongoing automation and digitalization. The digitalization of manufacturing is optimizing with integrated technologies and communication technologies. With these new integrated systems, it is possible for the factory of the future to be adaptive with respect to the production. Consequently, the qualifications and skills of the skilled labor, which are required to fulfil the tasks occurring in a factory of the future, will differ as well. The constantly changing list of skills required for Industry 4.0 must be regularly updated so that the relevant adjustments in the education system and upskilling existing ones can be customized. In future, the focus will be on interdisciplinary thinking and acting, cross-functional process know-how, and skills involving specialized and more general application knowledge. The goal should be to prevent a two-fold digital divide between large and small industrial enterprises and between high-skilled and low-skilled workers. SMEs should receive special support to help them develop the skills needed for Industry 4.0. Our aim is to look for the arsenal of skills/competencies future demands of us and that the contemporary managers need, as well, to cope with revolutionary challenges of Industry?

This paper talks about a few skills needed and forms as the learning concept which integrates the skills and tries to address the identified research demands. Finally, it has been concluded of the learning and thoroughness for the need of managerial skills in the Industrial Revolution and to society.

## Key Managerial Skills

According to the literature the authors identified three main categories to classify core managerial competencies. Firstly, Technical Competencies that comprise all job-related knowledge and skills for example media skills, coding skills, knowledge management, and statistical command. Technical skills are abilities an individual acquires through practice and learning. Secondly, Managerial Competencies which include all skills and abilities

for the general problem is solving and decision making for example: analytical and research skills, conflict and problem solving, creativity. They focus on the ability to make business decisions and lead subordinates within a company, include ability, negotiations tactics and response behaviour. Thirdly, Social Competencies which include an individual's social values, motivations for example: ability to transfer knowledge, leadership skills, ability to work in a team. Social ability in which expectations for future interaction with others are built, and based upon which individual perceptions are developed of their own behaviour. However, the study is focused on exploring the Managerial Skills in business cooperation. Few important skills have been selected and discussed for analysis, as below: -

**Creativity & Innovation**
With an avalanche of new technologies, new products and new ways of working there is an important need of being creative to draw the benefits from changes. Today Robots can be helpful to us in many respects but creativity in humans cannot be completed by them and so it is becoming a key focus area for employers for the 21stcentury employees. Creativity is characterized by the ability to perceive the world in new ways, to find hidden patterns, to make connections between seemingly unrelated phenomena, and to generate solutions.

**Entrepreneurial Thinking**
Entrepreneurial Thinking skills refer to the ability to identify marketplace opportunities and discover the most appropriate ways and time to capitalize on them. It is more like a state of mind that opens your eyes and business processes to hidden opportunities.

**Complex Problem Solving**
It is mainly about attaining mental elasticity to solve the unforeseen problems and being able to relate them to the landscape that's changing at breakneck speed and getting more complex. Solving problems involves both analytical and creative skills. Analytical or logical thinking includes skills such as comparing, evaluating and selecting. It provides a logical framework for problem solving. Also, it is an essential skill in the workplace and personal situations.

**Critical Thinking**
People who can turn data into insightful interpretations will be sought after due to the complexity and interconnectedness of various fields like computer science, engineering and biology.

**Conflict Management**
Avoiding conflicts in an organizational format, identifying conflicts if any and resolving conflict is a key skill for a Manager. Thus managing and resolving conflict requires emotional maturity, self -control, and empathy. Further, conflict management is a skill that can be developed and practised over a period of time.

**Decision Making**
Decision making is the process of making choices by identifying a decision, gathering information, assessing alternative resolutions, implementation and following up. Decision-making is an integral part of modern management. Essentially, Rational or sound decision making is taken as primary function of management. According to Dictionary, the term decision making means – the process of deciding something important, especially in a group or in an organization.

**Analytical Skills**
Analytical skills are the thought processes required to evaluate information effectively. Analytical skills are the ability to visualize, gather information, articulate, analyze, solve complex problems, and make decisions.

**Research Intelligence**
Research skills can be from the need to be able to use reliable sources for continuous learning in changing environments. Ability to provide in depth information and advice on a given topic is an important skill. The most successful people tend to develop research skills early and use them consistently to efficient productivity.

**Coordinating with Others**
Effective communication and team collaboration skills will be a top demand among job candidates in any industry.

**Social Intelligence**
Social Intelligence talks of and considers the application of social and non-formal platform for beneficial outcomes. It involves spotting right areas at right time and understanding the need and use of such platforms for different purposes and also as alternatives to connect for innovation and creative linkage.

**Emotional Intelligence**
Qualities that relate to emotional intelligence such as empathy that curiosity will be a big consideration factor for hiring managers of the future.

**Adaptive Thinking**
Ability to determine the meaning of what is being expressed and what is to be conveyed in a manner so as to communicate and be in sync with the change that is foreseen. Being open to change as with technology and to different methodologies is covered under the process of Adaptive think which serves as very important skill for coping with revolution.

**People Management**
Irrespective of how many jobs get automated and how advanced Artificial Intelligence becomes, employees will always be a most prized resource. Humans are more creative, better at reading each other and able to piggyback of many ideas and energy, but this also

means that we humans also get sick, we get demotivated and get distracted. So, it is important that managers and team leaders are aware of how to motivate their respective teams, maximize their productivity and respond to needs. Thus, knowing how to delegate and plan the tasks as to available resources in sync with business needs. It also considers the proper use of resources, fulfilling their needs and demands and also retention of resources.

**Service Orientation**

People who know the importance of offering value to clients in the form of services and assistance will be in demand as businesses would want to provide solutions to the problems of society.

**Research Methodology**

A questionnaire survey was conducted in 2017, amongst the experts (high qualified managers) of the automotive and pharmaceutical industries, employed in transnational companies (TNC's). Considering 10 experts from each sector, who filled the questionnaire.

Automotive and Pharmaceutical Industry branches were considered for the purpose of study. Since these two industries are self-motivated and rely primarily on novel technologies as well as product and process innovations formed the basis of selection for this study. Their choice was supported by other specific characteristics of these industries. Also, both industries search for and employ qualified personnel. Furthermore, they are oriented toward ongoing improvement of competencies. On the other hand, they also differ in certain fundamental aspects. In the automotive sector, it is the entrepreneurship that determines its global reach, whereas in the pharmaceutical industry it is related by social and demographic changes. It is also important to note that despite an increase in efficiency in the pharmaceutical industry, it is still lower than in automotive enterprises.

**Study results for the automotive sector**

The automotive industry is the highly consolidated sector, with the global overcapacity of about 30%. The market is rather saturated and demand is driven by product replacement. The Profit margin on new cars is relatively low, particularly in the low price/high volume segments of the market. The automotive industry is one of the most important worldwide drivers of growth and employment, as well as technological and managerial innovation.

The automotive industry is a highly competitive market with a widespread use of new technologies and innovations, and a high level of employment. It is not only the fastest growing sector, but also one of the largest employers in the Polish industry, directly responsible for 65% of all jobs in industrial enterprises. Between 120 and 150 thousand people work at factories producing cars, car parts and subassemblies.

Replies submitted by respondents from the automotive industry are characterized by similar evaluations of selected competencies (Table 1). This applies in particular to competencies related to entrepreneurial thinking, analytical skills and time management abilities. The greatest diversity was noted in the assessment of research skills. The finding is likely to be related to the fact that the value of such competencies for managerial staff in the industrial sector is underestimated.

**Table 1. Assessment of competencies in the automotive sector**

| | Managerial competencies | Arithmetic mean | Standard deviation |
|---|---|---|---|
| 1 | Creativity | 3.71 | 0.92 |
| 2 | Entrepreneurial thinking | 4.57 | 0.53 |
| 3 | Problem solving | 4.25 | 0.71 |
| 4 | Conflict solving | 4.25 | 0.71 |
| 5 | Decision making | 4.57 | 0.92 |
| 6 | Analytical skills | 4.13 | 0.35 |
| 7 | Research skills | 2.38 | 1.51 |
| 8 | Efficiency orientation | 4.50 | 0.53 |

**Study results for the pharmaceutical sector**

The pharmaceutical industry is one of the most rapidly growing industrial sectors both in Poland and across the world. It is characterized by a growing degree of automation and computerization. Polish manufacturers are increasingly oriented towards the markets in advanced drugs. The growth of the industry is chiefly determined by social and economic factors including ageing of the societies, increasing wealth, good economic climate and, last but not least, decisions made by officials. The latter factor grows in importance depending on the price of the drug. In the European Union countries, about 83% of the price of drugs is paid by institutions responsible for public health.

The pharmaceutical industry ranks among the most stable economic sectors. A growth in society's wealth is accompanied by an increasing demand for pharmaceutical products. As the value of the pharmaceutical market experiences stable growth, pharmaceutical companies need highly qualified personnel.

Replies submitted by experts from the pharmaceutical industry are similar with regard to the decision-making skill (Table 2). All respondents from the sector consider it to be very important for Industry 4.0 workers. Similarly to the automotive industry, the greatest variation was observed in the assessment of research skills.

**Table 2. Assessment of competencies in the pharmaceutical sector**

| | Managerial competencies | Arithmetic mean | Standard deviation |
|---|---|---|---|
| 1 | Creativity | 2.57 | 0.54 |
| 2 | Entrepreneurial thinking | 3.57 | 0.79 |
| 3 | Problem solving | 4.86 | 0.38 |
| 4 | Conflict solving | 4.71 | 0.49 |
| 5 | Decision making | 5.00 | 0.00 |
| 6 | Analytical skills | 4.14 | 0.90 |
| 7 | Research skills | 2.29 | 1.38 |
| 8 | Efficiency orientation | 4.43 | 0.53 |

**Comparative Analysis**

Knowledge becomes a key determinant

of the development potential of enterprises. Employees with entrepreneurial thinking skills stand out because they tend to think creatively and take ownership of their jobs as well as performance. This is recognized by experts from the automotive sector. Experts (practitioners) attach a very high value to competencies related to decision-making (Fig. 1). Such thinking probably arises from the view that the ability to make optimal and effective decisions is the only way to increase efficiency and win a strategic advantage.

Interestingly, the competencies related to research skills were not valued very highly. Research competencies and skills are essential for the effective conduct and understanding of research and ultimately for evidence-based decision-making in business. The development of research competencies is particularly relevant for junior employees whose career is increasingly dependent on their research output.

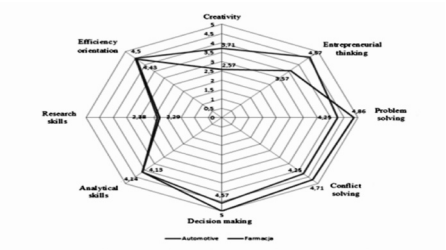


**Fig. 1. Comparison of managerial competencies**

## Conclusion

The paper describes key managerial skills and modular learning techniques for the Industrial Revolution which is gaining importance and turning out to be a competitive platform in all market verticals. The development of new technologies triggers improvements in the quality of life, upskilling human brain which leads to further innovations and hidden grounds for the scope and the welfare of whole society. It also functions as the main driving force behind the contemporary global economy. Fourth Industrial Revolution encourages innovation in basic research methodologies, new solutions adopted and implemented in the economy, monitoring practical effects of such implementations and identification of the potential for new implementations. For those to be possible, employee support and improvement of their competencies are necessary which is through practicing and learning new skills thus sailing through a smooth path.

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