**Leadership vs. Management in Engineering: Roles and Responsibilities Explained**

Nithish Sunkara

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Indiana Institute of Technology  
Jeff Ritchie

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1. **List the three primary management levels and discuss the primary responsibilities of managers at these levels.**

Executive management, middle-level management and supervisory/first-line management are the principal levels of management.

**Executive management level (Top level):** Managers at the highest level are responsible for setting organizational goals, creating policies, and determining major strategies for the company. These roles include CEOs, CTOs, and VPs (Robbins & Coulter, 2022).

**Middle-level management:** Middle-level managers turn strategic goals into tasks that can be accomplished by employees. They are responsible for leading departments and directing actions within them (Mintzberg, 1990).

**Supervisory/First-Line management (Low level):** Lower-level managers are responsible for groups of employees and keep track of daily activities. They help manage the organization’s operations by giving each rank specific tasks and accountability.

Overall, breaking down management into different ranks helps organizations remain focused, follow a plan, and stay accountable.

1. **Differentiate engineering management from traditional management. Are there unique challenges to managing technical/knowledge workers?**

The biggest difference between engineering management and traditional management is how broad it is, the skills needed and its focus.

* **Technical Expertise:** Engineering Managers are very skilled in understanding engineering systems and usually lead work on innovation and design. Managers in the past did not have to be knowledgeable in specific technical areas (Morse & Babcock, 2010).
* **Problem-Solving Approach:** Engineering managers tackle challenges using analysis, depending on data and rely on system-oriented thinking and models to find solutions (Blank & Dorf, 2020).
* **Unique Challenges:** Managing experts or technically skilled professionals raises issues like encouraging them to be creative, maintaining their focus on routine jobs, and controlling people who are quite autonomous (Drucker, 1999). Many of these workers oversee their own tasks and look for meaningful jobs that challenge them which adds challenges when it comes to motivating and assessing them.

1. **Describe the tools of Scientific Management introduced by Fredrick Taylor and Frank and Lillian Gilbreth. How are these used in decision-making?**

Frederick Taylor and Frank and Lillian Gilbreth promoted efficiency and better production by introducing the following as key tools in Scientific Management:

* **Time Studies:** Using stopwatches, Taylor observed the amount of time required for each activity, enabling him to improve the efficiency of tasks (Taylor, 1911).
* **Motion Studies:** To become more efficient, the Gilbreths looked at the movements involved in work and cut out the extra ones (Gilbreth & Gilbreth, 1917).
* **Standardization of Tools and Tasks:** Taylor encouraged the use of tools and procedures to ensure consistency and reliability in the job.
* **Worker Selection and Training:** Choosing the right employee for each job and training them properly for the work they have been chosen for.

These tools make decision-making easy by looking at how work is processed and cutting unneeded waste, all while boosting productivity (Wren, 2005).

1. **Define globalization and discuss how it is impacting the role of the engineering manager.**

The term globalization means that nations’ economies, markets, and cultures are becoming more connected via worldwide trade, investment, and information technology (Friedman, 2005). Engineering managers feel various effects from the process of globalization.

* **Diverse Teams:** Managers must lead people from many cultures and various places, they need to have effective communication and intercultural abilities (Dowling, Festing, & Engle, 2017).
* **Global Supply Chains:** Engineering managers must be familiar with logistics, relationships with suppliers from different countries, and international rules.
* **Innovation Pressure:** Because of global competition, businesses are pushed to invent new things every day, forcing engineering managers to follow modern practices everywhere.
* **Regulatory Compliance:** Diverse international laws, guidelines for protecting the environment, and rules for safety need to be considered by managers when organizing and implementing a project (Schilling, 2017).

Consequently, globalization requires individuals to have competence in technology plus strategy and local customs.

1. **In the article by Peter Cappelli, (**[**https://empowerment.ee/wp-content/uploads/2020/10/Stop-Overengineering-People-Management.pdf**](https://empowerment.ee/wp-content/uploads/2020/10/Stop-Overengineering-People-Management.pdf)**) *Stop Overengineering People* *Management,* he discusses the use of contract workers versus direct employees. What issues might an engineering manager have in a work environment where contract employees make up a significant percentage of the work team?**

There are important difficulties in contractor-based teams when engineers are the leaders. Some of these issues are:

* **Lack of Engagement and Loyalty:** Employees who work under contracts usually do not give the same amount of heart and dedication as individuals on the payroll. Because of this, employees might collaborate less, form weaker teams, and fail to stay loyal to the goals of the organization for years.
* **Knowledge Retention Problems:** It can be hard for contractors to build or transfer knowledge about the company since they are not with the business for an exceedingly long time. This may cause challenges in engineering projects that need information from the past, require constant experiments, or demand considerable understanding of the systems.
* **Uneven Management and Development:** Cappelli argues that using elaborate management systems is a problem. If a mix of contractors and employees is included and performance, training, and oversight systems are different, it may divide the team further.
* **Confusion Over Roles and Expectations:** Unclear Duties for Engineering Managers: At times, engineering managers do not know their duties well because contract staff might expect certain matters to be handled differently than normal.
* **Cultural Fragmentation:** Some contract workers fail to join in with the company’s culture. Because of this, people may focus on themselves against others, which prevents collaborative efforts and new methods important for engineers.
* **Legal and Ethical Boundaries:** Since there are certain rules about managing contract workers, the manager can find it harder to guide the entire team.

With contract workers, engineering managers should pay special attention to make sure productivity, consistency, and morale remain high.

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