

Pearson BTEC Levels 4 Higher Nationals in Engineering (RQF)

Engineering Management Unit Workbook 1

in a series of 1 for this unit

Learning Outcome LO1 to LO4

Engineering Management

4 MAIN CONCEPTS AND THEORIES OF MANAGEMENT AND LEADERSHIP

4.1 Management and Leadership.

The words “leader” and “manager” are among the most commonly used words in business and are often used interchangeably. But they are far from the same thing.

A manager is the member of an organization with the responsibility of carrying out the four important functions of management: planning, organising, leading, and controlling.

Most managers also tend to be leaders, but only IF they also adequately carry out the leadership responsibilities of management, which include communication, motivation, providing inspiration and guidance, and encouraging employees to rise to a higher level of productivity.

Unfortunately, not all managers are leaders. Some managers have poor leadership qualities, and employees follow orders from their managers because they are obligated to do so—not necessarily because they are influenced or inspired by the leader.

Managerial duties are usually a formal part of a job description; subordinates follow as a result of the professional title or designation. A manager’s chief focus is to meet organisational goals and objectives; they typically do not take much else into consideration. Managers are held responsible for their actions, as well as for the actions of their subordinates. With the title comes the authority and the privilege to promote, hire, fire, discipline, or reward employees based on their performance and behaviour.

The primary difference between management and leadership is that leaders don’t necessarily hold or occupy a management position. Simply put, a leader doesn’t have to be an authority figure in the organisation; a leader can be anyone.

Unlike managers, leaders are followed because of their personality, behaviour, and beliefs. A leader personally invests in tasks and projects and demonstrates a high level of passion for work. Leaders take a great deal of interest in the success of their followers, enabling them to reach their goals to satisfaction—these are not necessarily organisational goals.

There isn’t always tangible or formal power that a leader possesses over his followers. Temporary power is awarded to a leader and can be conditional based on the ability of the leader to continually inspire and motivate their followers.

Subordinates of a manager are required to obey orders while following is optional when it comes to leadership. Leadership works on inspiration and trust among employees; those who do wish to follow their leader may stop at any time. Generally, leaders are people who challenge the status quo. Leadership is change-savvy, visionary, agile, creative, and adaptive.

4.2 Leadership Models.

This Workbook concentrates on the ten most popular contemporary leadership theories. However, it is sometimes useful to categorise them as follows;

Trait-Based	The oldest type of thinking about effective leadership. Logically, 'Trait-Based' leadership models focus on identifying the traits of successful leaders.
Behavioural Ideals	'Behavioural Ideals' leadership models concentrate on what researchers believe are the most effective behaviours as a leader. The notable model in this category is <u>Blake and Mouton's Managerial Grid</u> .
Situational/	'Situational' (or 'Contingency') leadership models are based on the idea that the leader's actions should vary according to the circumstances he or she is facing - in other words leadership methods change according to the 'situation' in which the leader is leading. This category includes most notably: <u>Kurt Lewin's Three Styles model</u> ; <u>Tannenbaum and Schmidt's Leadership Continuum model</u> ; the <u>Fiedler Contingency model</u> ; <u>House's Path-Goal theory</u> ; <u>Hersey and Blanchard's Situational Leadership® model</u> ; and <u>Bolman and Deal's Four-Frame model</u> .
Contingency	Functional types of leadership models focus on what the leader has to do. Unlike the Behavioural Ideals approach, Functional leadership models do not suggest ideal ways of behaving, nor do they match behaviours to circumstances like Situational/Contingency theory. Instead, Functional leadership models focus on the action areas that a leader must address to be effective. The most notable Functional models are <u>John Adair's Action-Centred Leadership</u> , and <u>Kouzes & Posner's Five Leadership Practices</u> .
Functional	The Integrated Psychological leadership model is so called because it integrates the thinking behind the four leadership model's sub-groups, while also addressing the leader's inner psychology, which tends not to be considered in other more traditional or conventional types of leadership models. <u>James Scouller's Three Levels of Leadership model</u> arguably pioneers this category. Scouller's model can be regarded as a relatively new view of leadership.

4.3 Ten Leadership Theories

One of the great challenges when it comes to proper leadership is balancing the various interests of those who you are required to lead. Not everyone is going to have the same goals and aspirations, even within the same business or organisation.

Therefore, it is the job of a good leader to reconcile all of those various interests and bring them together in a way that keeps the team working in the right direction. With good leadership, it is possible to bring everyone together in a common pursuit even if they have divergent goals among themselves.

4.3.1 Action Centred Leadership (ACL)

ACL is notable because it can help reconcile the various goals and desires of individuals while still accomplishing the specific goals set out for the team and the project as a whole.



Figure 4:1 Action Centred Leadership

At its simplest form, the model can be described by how it divides leadership into the areas of 'Task', 'Team' and 'Individual'. Each element plays an important role in the leadership picture, and only when all three are balanced properly will the leader be achieving success.

Harmony among the three might not always be the easiest goal to reach, but it is the job of the leader to make it happen. Looking at each element in turn you can understand how each of these three aspects is important. (See Figure 4:1)

4.3.1.1 *It All Starts with a Task*

Without a task, there is no reason to have a team made up of individuals, and no reason to lead them in the first place. No matter what the goal is, that task is what will guide the leadership that has to be provided to the team.

One of the most important jobs of the leader is to actually define and identify the task at hand. Sometimes this will be quite easy, but other times it can actually be a serious challenge. Teams work together better when they are clear on the task at hand, so providing that definition in no uncertain terms is a major part of the equation.

Among the other important parts of the task, including identifying milestones that need to be met, is establishing who is responsible for which part of the task, and what will be defined as success in the end. Monitoring progress and making sure that the group is getting closer and closer to accomplishing the task falls on the leader and is an important part of the Action Centred Leadership model.

4.3.1.2 *Teamwork is Essential*

Leading the team is what most people think of traditionally as being 'leadership'. Any given team is made up of individuals with various skills and experiences, so it is up to the leader to extract the best possible performance from each of them. The leader should define how the team works together, such as communication standards and methods for resolving conflict.

Encouragement is another important part of the Action Centred Leadership plan, especially for long projects. The members of the team need to remain focused on the 'prize' at the end of the task, so they can remain motivated and determined to reach a successful conclusion to the project. Making sure that the

team as a whole feel invested in the success of the group is something that a good leader will be able to accomplish.

4.3.1.3 Don't Forget About the Individuals

Forgetting about individuals within the team is probably the most common leadership mistake that is made by managers in all areas of business. Extracting the best from each person on the team means treating them as the individual that they are. Offering rewards or praise for a strong contribution to the team is a common tact for getting the best possible performance from members of the team. Only when the leader is able to place each person in the role that is best suited for them will the team be able to function as successfully as possible.

Action Centred Leadership is a popular leadership model to follow in large part because of the simplicity that it offers. Task, Team, and Individual

Key Points
<ul style="list-style-type: none"> • Action Centred Leadership involves balancing task, team and individual focus. • Each of these three elements plays an important role in the leadership picture, and only when all three are balanced properly will the leader be achieving success. • No matter what the goal is, that task is what will guide the leadership that has to be provided to the team. • Making sure that the team as a whole feel invested in the success of the group is something that a good leader will be able to accomplish. • Only when the leader is able to place each person in the role that is best suited for their skills and interests will the team be able to function as successfully as possible.

Table 4:1 ACL Key Points

4.3.2 Blake-Mouton Managerial Grid

The Blake-Mouton Managerial Grid is a system that can be used to group like leaders into categories based on the methods that they use.

While no organisational system will ever be perfectly complete, this grid is a great way to understand more about certain leadership styles and how they work. Dating back to the early 1960's, this is a framework that has stood the test of time and remains relevant today.

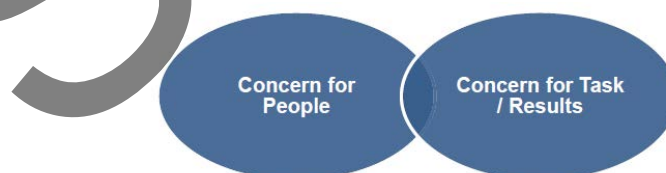


Figure 4:2 Blake-Mouton Managerial Grid

The two dimensions of this grid quickly identify the priorities of the manager in question - 'Concern for People' and 'Concern for Results' – and it doesn't get much simpler than that!



Figure 4:3 Blake-Mouton Managerial Grid – Four Quadrants

The real benefit of using the Blake-Mouton Managerial Grid comes when you start to look at it in terms of four quadrants, and what each of those means for the manager. When plotted on the grid based on the two dimensions, there are four possible quadrants that a management style can adopt.

Impoverished Management - in this case, the manager is failing both in terms of the task and the people and is not a desirable position. The work isn't being completed successfully enough to satisfy the needs of the organisation, and the individuals involved aren't getting what they need out of it either. This is a systemic failure and will usually result in bad outcomes for the leader in question.

Country Club Management - most employees love this. The results may be suffering, and the manager's superiors may not be impressed with their performance, but the employees are happy because they are being put first and having their needs met through the actions of the leader. While the short-term results of this method may be enjoyable, the long-term results tend to be less beneficial once the results come in and the group is falling short of expectations.

Authority-Compliance Management - is the opposite of the Country Club management position. Instead of paying sole attention to the employees, this leader is only serving the needs of the project and the results they are looking for. While they might reach the end goal, bridges could be burned in the meantime through the methods that are used. Unhappy employees tend to leave sooner or decrease in production as their attitude drops. Short-term projects may benefit from this kind of strict management style, but it is unlikely to succeed over time.

Team Management - offers the best of both worlds. This manager is able to successfully juggle the needs of the organisation as a whole with the needs of the individual employees involved. Of course, since this is the best model for most managers to strive for, it is also the most difficult to achieve.

The Blake-Mouron Managerial Grid is a good starting point for understanding the basic leadership options that a manager has when dealing with their employees. Avoiding the extremes and trying to balance all of the various interests at any one time is usually the best tack to take.

Key Points

- The Blake-Mouton Managerial Grid is a system that can be used to group like leaders into categories based on the methods that they use.
- It uses a two-dimensional grid to identify the priorities of the manager in question.

- The axes are 'Concern for People' and 'Concern for Results' giving four possible quadrants that a management style can land in.
- Impoverished Management - the manager is failing both in terms of the task and the people.
- Country Club Management - employees are happy because they are being put first and having their needs met through the actions of the leader.
- Authority-Compliance Management - the manager is focusing too much on getting the task done at the expense of their team's wellbeing.
- Team Management - the manager is able to successfully juggle the needs of the organisation as a whole with the needs of the individual employees involved.

Table 4:2 Blake-Mouton Managerial Grid - Key Points

4.3.3 Dunham & Pierce's Leadership Process Model

The Dunham and Pierce Leadership Process Model doesn't necessarily seek to define leadership, but it does the job indirectly. This model addresses all of the key elements that play a role in leadership and helps the manager to understand how each part affects the other parts of the equation.

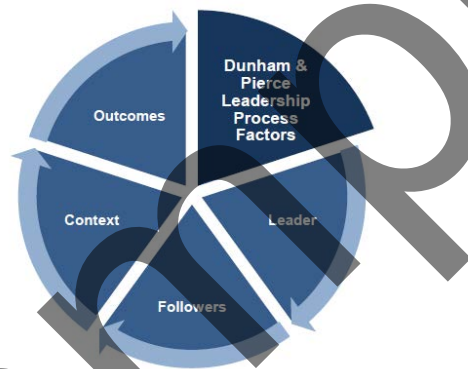


Figure 4:4 Dunham & Pierce's Leadership Process Model

Leadership will never be simple, but using this model is a good way to 'get yow head around' the various moving parts and hopefully bring it into better focus in your mind. According to Dunham and Pierce, there are four factors that play a role in the leadership process.

1. **Leader** - the person in charge of a project or team, regardless of what their title may be. The important thing is that they are the person who a group of others answer to, and it is their performance that we are worried about with this model.
2. **Followers** - the people who are being led. Generally, these will be employees of the company in question. Most commonly, the Followers for a specific manager fall within a group or division of the company. The performance that the Leader is able to coax out of the Followers will largely be responsible for the outcomes that are achieved.
3. **Context** - refers to the circumstances under which the Leader is managing his/her team. Whether it is a project that will run for a predetermined length or time, or simply employees working on a day-to-day basis, the context of leadership plays an important part in what style of management is going to be most successful. This is an element that is often skipped over in some leadership models and discussions.

4. *Outcomes* - the results of any project or task that has been worked on by the Followers under direction of the Leader. Above all else, leaders tend to be judged on their Outcomes because they usually have the most direct influence over the bottom line.

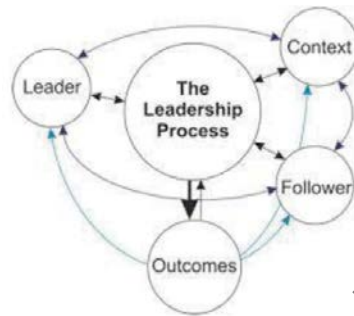


Figure 4:5 Dunham & Pierce's Leadership Process Model - Interconnectivity

The overarching theme of this model is that *all of the aspects of leadership are interconnected* in one way or another by a circular rather than linear relationship.

Basically, everything done within the context of a leadership situation is important, and it all comes around in the end in one form or another. Things that are done to help the team and empower the individuals on a team can serve to improve future outcomes, while any negativity is likely to manifest itself in unwanted ways. Taking a holistic approach to management can be powerful when it comes to guiding a team toward long-term success.

This model has plenty to teach leaders and managers in a variety of settings, but some of the most important lessons are:

- *Grow relationships with the team.* Since this model of leadership is circular in nature, it only makes sense that growing relationships well help everyone perform better. When the relationships are strong from the top down, communication will benefit, and the team should work more efficiently as a whole.
- *Let people do what they do best.* This is key for any leader, no matter what context they are working in. When people are able to spend time working on projects that they feel comfortable with and that match up with their skill sets, they tend to be happier (and perform better). When leaders fail to consider the skills of their people, it should be no surprise the results fall behind.
- *Offer feedback.* This point goes along with the point regarding relationships among the team. Feedback is valuable because it helps to steer the members of the team in the right direction, in a positive way. Opening the lines of feedback helps the Followers learn what is expected from them, and also gives them an opportunity to provide feedback to the Leader - which can be invaluable.
- *Act Ethically and Honestly.* The circular nature of leadership dictates that it is vitally important to act with a high degree of honesty on a regular basis. When deceit creeps into the system, it is likely to spread and have a negative effect throughout the organisation.

Leadership is complicated and sometimes scattered and chaotic, but the Dunham Pierce Leadership Process Model does a good job of highlighting the key points and identifying how they all affect one

another. For the leader who is trying to keep a variety of different interests happy throughout the term of a project, this model can help to sort things out and keep them moving in the right direction.

Key Points
<ul style="list-style-type: none"> The Dunham and Pierce Leadership Process Model addresses all of the key elements that play a role in leadership and helps the manager to understand how each part affects the other parts of the equation. This model states that there are four factors that play a role in the leadership process: The Leader, the Followers, the Context, and the Outcomes. The meaning of Leader and Followers is self-evident. Context refers to the circumstances under which the Leader is managing his or her team and Outcomes refers to the results of any project or task that has been worked on by the Followers under direction of the Leader. The model suggests that everything done within the context of a leadership situation is important and if you are able to learn from your team and how their actions dictate the Context and the Outcomes, everyone will have a better chance at success.

Table 4:3 Dunham & Pierce's Leadership Process Model - Key Points

4.3.4 Fiedler's Contingency Model

Fiedler's Contingency Model is an interesting look at leadership styles and how different approaches can lead to very different results depending on the circumstances. As the term 'contingency' would indicate, this model is based on the idea that rather than having a single leadership style for all circumstances, the best approach is to be able to vary the leadership that is provided based on the group and task at hand.

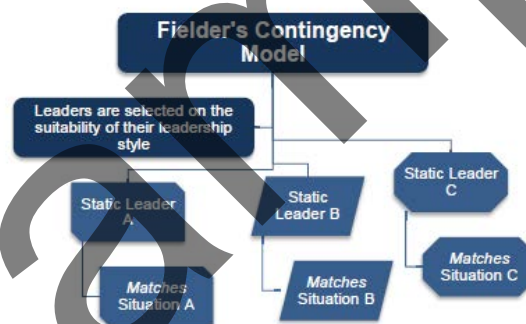


Figure 4:6 Fiedler's Contingency Model

Fiedler argues that a specific leader is only able to lead in one fashion, meaning that another person will need to be tasked with the job if a different leadership style is required. Straight away, there are some elements of this model that make sense when you think about how they will be applied. Most people would agree that a 'one size fits all' approach is not going to be effective when it comes to leadership; rather, it will take a variety of styles and techniques to achieve success in the long run. However, the idea that an individual leader is unable to change their ways based on the needs of their team is one that will likely be argued by many. Regardless, the model is certainly worth taking a closer look at for its many interesting insights.

Starting with the idea of a leader who is unable to change his/her ways, ('Static Leader'). Fiedler uses a scale to determine what kind of leader an individual will be. The scale used is the 'Least-Preferred Co-Worker' scale and is the subject of much debate as to its practicality. Basically, this scale asks a series of questions that the leader is supposed to answer while thinking about their 'least favourite' person that

they have ever worked with. In order to arrive at a result, the leader is supposed to rank that person on a scale of 1-8 on a variety of personality traits such as Unfriendly to Friendly, and Hostile to Supportive. There are 16 of these rankings to complete, after which the leader will be left with a score that they can use to identify where they fall within the leadership spectrum.

- Low scores show a leader is more focused on tasks as opposed to relationships.
- High scores represent a leader that is more focused on building relationships with their teams.

The idea that these numbers are 'set in stone' is something that many people will disagree with. It seems logical that leaders will develop and evolve over time, potentially changing the score that they would receive on this scale. Also, depending on the person in question whom they were thinking about while answering the questions, the results could be skewed based on one strongly negative memory.

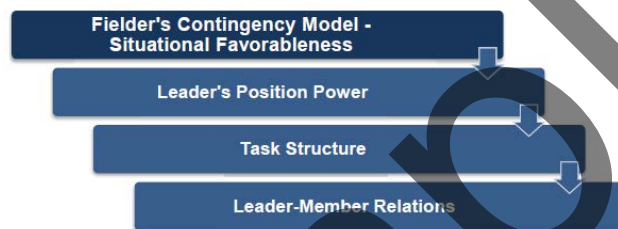


Figure 4:7 Fiedler's Contingency Model – Situational Favourableness

Making up the other half of this leadership model is the idea of 'Situational Favourableness'. Each of its three factors has a say in how a certain type of leader will fare in a given situation.

- **Leader's Position Power.** How much power is the leader being given in a situation? Is their word final when disputes arise, or does the next level of management dictate decisions down to the leader? The model classifies these rankings into two categories:
 - *Strong leader* one who has a high level of power within the organisation.
 - *Weak Leader* someone controlled from above to a greater degree.
- **Task Structure.** There are two kinds of tasks according to this model:
 - *Structured tasks* are detailed and clear as to what they expect from each of the team members.
 - *Unstructured tasks* may be open ended or undefined in terms of the goals and missions for the team.
- **Leader-Member Relations.** Judges how good the relationship is between the team members and the leader? The type of project that is being undertaken, and the ranking on the other two points on the Situational Favourableness scale will determine what kind of leader it takes to match up with the job. While most of the time a stronger relationship between leader and team is going to be preferred, that will not always be the case.

While Fiedler's Contingency Model is an interesting look at leadership styles and their effectiveness in certain situations, the limitations are pretty evident right from the start. Basing a person's leadership style

on their interactions with one single co-worker could potentially lead to a misleading outcome, and each of the three factors probably aren't as black and white as they are required to be in order to use this model.

However, using this model to get an idea of what kind of leadership style you use, and what circumstances will be best-suited for you to manage, is an opportunity to gain insight and perspective. The Contingency Model can help you think about how you manage, and why you might be more successful in some situations than in others.

Key Points
<ul style="list-style-type: none"> Fiedler's Contingency Model is based on the idea that rather than having a single leadership style for all circumstances, the best approach is to be able to vary the leadership that is provided based on the group and task at hand. Starting with the idea of a leader who is unable to change his or her ways, we see that Fiedler uses a scale to determine what kind of leader an individual will be. Making up the other half of this leadership model is the idea of 'Situational Favourableness', which has three components: Leader's Position Power, Task Structure, and Leader-Member Relations. Leader's Position Power refers to how much power is the leader being given in a situation. A strong leader is one who has a high level of power within the organisation, while a weak leader is controlled from above to a greater degree. Task Structure - structured tasks are detailed and clear as to what is expected from each of the team members, whereas unstructured tasks may be open ended or undefined in terms of the goals and missions for the team. Leader-Member Relations refers to the relationship between the team members and the leader. Fiedler's Contingency Model can give you some insight into the leadership styles available to you provided that you are aware of its limitations.

Table 4:4 Fiedler's Contingency Model - Key Points

4.3.5 French & Raven's Five Forms of Power

In any situation where one person is deemed to be the 'leader', they are also likely to be the person with the most power to make decisions. If you find yourself in a position of leadership within your organisation, it is safe to say that you have a good deal of power as well.

The 'Five Forms of Power' research was important because it strived to determine what it is that makes someone powerful in a given setting. By describing each of the five types of power, leadership capabilities can be assessed.

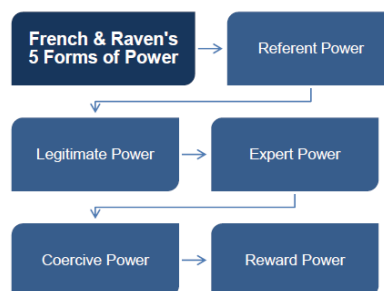


Figure 4:8 French & Raven's Five Forms of Power

- Reward Power** - is one of the more common types of power. The 'reward' can take many different forms, but it is typically financial. If you have the ability to reward team members (bonuses or wage rises), you have the ability to command their attention through those rewards. Assuming the team members you lead are interested in achieving the rewards that you can offer, they will be likely to work

well with you in order to improve their chances of receiving the rewards.

One of the problems that can arise from using rewards to command power is when you aren't able to offer rewards that are appealing to those whom you lead. For example,

If you don't have the power in your company to offer financial rewards of any significance, you have to try to appeal to your team with other benefits and perks that might not be as desirable to them.

In order for reward leadership to be effective, the leader must be able to offer rewards that the team members are striving to receive.

2. **Expert Power** - is achieved when someone is in a position of expertise based on their knowledge or experience. For example,

If you are working on a project with a group of co-workers whom are normally your peers – but you happen to be an expert in the specific field that you are dealing with - you may find yourself elevated to a position of authority and power.

However, often times this type of power is informal rather than official. You might find that you are commanding more attention in meetings and your opinion is being given more weight, but you might not have received any of the other typical signs of leadership.

Coming into power through being an expert can have long-lasting career benefits. Because this kind of power is more organic than the others, it is more likely to remain long after a specific project or task is completed. When others know that someone is an authority on a given subject, that reputation should follow them throughout their career.

3. **Legitimate or Title Power** - is often the most recognized form of power and leadership, because it comes along with being appointed to a specific position. Why does the U.S. President have power? Because he holds the title of U.S. President, and all of the authority that comes with it. In this case, the power is granted because of a person's title rather than the individual's character.

Within organisations legitimate power tends to fall with the people who hold titles. This kind of power can be extremely useful while it is held, but it tends to dissolve as soon as the title is taken away.

4. **Coercive Power** - leaders control team members by the ability to take things away, rather than 'reward'. If you can fire someone based on their lack of performance, for example, you have coercive power to influence their actions. They are likely to try to impress you and meet your expectations in order to keep their job. In many cases, coercive power is only good enough to get people to do the minimum required to avoid punishment. Unlike reward power, where team members may strive for excellence in order to achieve certain rewards, coercive leaders are more likely to get the bare minimum from their team who is simply hoping to stay out of trouble.

5. **Referent Power** - can be compared to an 'x-factor', because it is power that does not come for any obvious reason. Frequently, those who have referent power are simply well-liked by others based on their attitude, charm, or even good looks. They don't necessarily have any logical reason for having come to power, yet they still hold sway over many people for some reason. If you are naturally a person that others gravitate towards and want to talk to, there is a good chance you already have a measure of referent power.

Understanding what kind of power you have, and why you have it, is a valuable lesson that can be used to better lead people. Most likely, you will have some combination of the five types of power that are

outlined above. Think about what kind of power you already have in your position, and what kind of power you should be working toward achieving to further your career.

Key Points
<ul style="list-style-type: none"> French and Raven's Five Forms of Power attempts to determine what it is that makes someone powerful in a given setting. Reward Power is typically financial when talking about a leader within a company, for example the ability to reward your team members with things like bonuses or pay raises. Expert Power is achieved when someone finds themselves in a position of power based on their knowledge or experience. Legitimate Power can also be referred to a 'title power', because it is the power that comes along with being appointed to a specific position. Coercive Power is the opposite of reward power and is based on the ability to take things away. In the workplace this would normally mean being able to demote or fire someone. Referent Power is power that is not achieved by any of the above, and may be based on something intangible like popularity, attitude, or charm. This model can help you to understand what kind of power you already have, and what kind of power you should be working toward achieving if you want to further your career.

Table 4:5 French & Raven's Five Forms of Power - Key Points

4.3.6 Hersey-Blanchard Situational Leadership Theory

The term 'situational' indicates that:

Leaders should vary their approach based on the people they are leading, and the circumstances that surround the task at hand.

The Hersey-Blanchard Situational Leadership Theory is one that is based around variable leadership, depending on a variety of circumstances. When a leader is able to adapt to the situation as quickly as possible, everyone will benefit in the end.

Specifically, this theory has to do with the maturity of those who are being led. To those who have worked as leaders in the past, it is no surprise that maturity should be considered when working on finding the right leadership style. For example, someone who is inexperienced in their field will likely lack the skills or confidence to take on tasks that would be comfortable for a more experienced employee.



Figure 4:9 Hersey-Blanchard Situational Leadership Theory

Only when a leader is able to mold their approach to the maturity and talent of those that make up the team will the overall performance be up to par.

The Situational Leadership Theory offers up four potential leadership styles, and then four maturity levels that define the members of a team. Let's quickly look at each of the four styles and levels that can then be paired up for optimal performance.

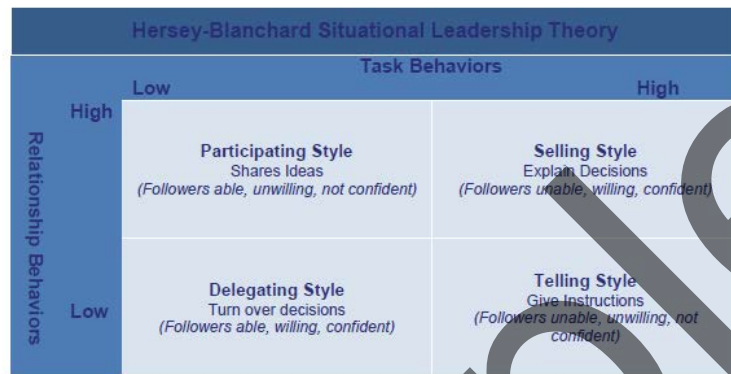


Figure 4:10 Hersey-Blanchard Situational Leadership Theory – Leadership Styles

The four leadership styles that are presented in this theory are:

Telling: is the most direct form of leadership. The leader of the group simply tells each member what to do, and how they would like them to do it. This is less collaborative, and more directive in nature. There is very little working together between the leader and the team members, the leader simply provides specific instructions for the team members to follow.

Selling: has a little more room for collaboration. While the team members are still directed by the leader, the leader is more likely to engage with team members. The 'Selling' label comes from the idea that the leader may need to convince some of the team members to follow his/her lead and do things in a specific way.

Participating: is a process where the leader tries to build relationships with those on the team, becoming part of the team. This is quite a departure from the Telling style, in fact, the leader might not even make all of the decisions in this style, perhaps deferring at certain points to members of the team with more experience or knowledge in a given area.

Delegating: represents the leader passing on most of the responsibilities for a given project or task to various members of the team. This style is something that leaders of experienced teams will often use, since the employees that are being led may not need much in the way of direction at this point in their careers.

To go along with those four leadership styles, the Hersey Blanchard Situational Leadership Theory also provides four maturity levels that describe those who are making up the team.

Maturity Level 1 (M1): These are the least experienced workers. They will need to be instructed on how to do just about everything that makes up the task they are responsible for. While this usually means a leader

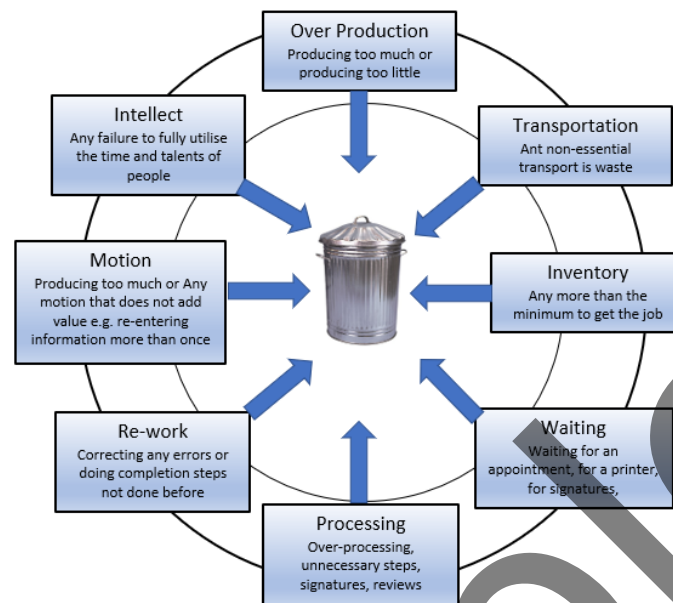


Figure 5:3 Lean focuses on the elimination of waste in a process:

5.2.5 Quality circle:

(Group or people-oriented approach) A quality circle is a participatory management technique that enlists the help of employees in solving problems related to their own jobs.

5.2.6 Six Sigma

- Measures how many defects/errors in a process
- Then figure out how to systematically eliminate them
- Finally get as close to perfection as possible

Six Sigma (DMAIC) Six Sigma is a set of techniques and tools for process improvement. It improves the quality of process outputs by identifying and removing the causes of defects (errors) and minimizing variability in manufacturing and business processes.

Six Sigma combines established methods such as: statistical process control, design of experiments, failure mode and effects analysis (FMEA) etc. in an overall framework.

Six Sigma Creates a special infrastructure of people within the organization: "Champions ", "Black Belts" "Green Belts", "Yellow Belts".

In Six Sigma programs the PDCA cycle is called (DMAIC); Define, Measure, Analyse, Improve, Control.

5.2.7 Kaizen

Kaizen, is a concept in which we practice continuous improvement in order to refine each and every process, making it more efficient and easier along the way. Its origin is a Japanese Term (Change for the better) and in English Term means "Continuous Improvement".

5.2.8 Continuous Quality Improvement (CQI)

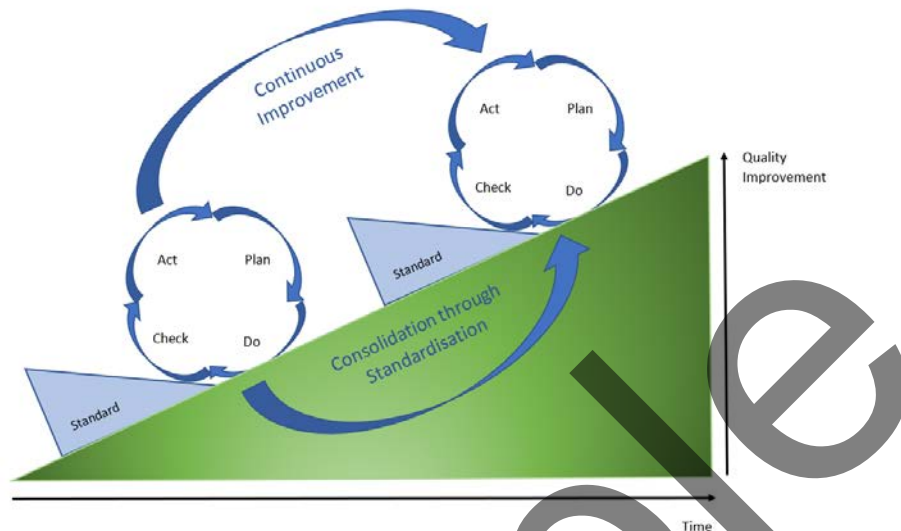


Figure 5:4 CQI

5.2.9 FOCUS-PDCA

FOCUS

- Find a process/ Opportunity for improvement
- Organize a team
- Clarify Current knowledge of the process
- Uncover causes of process variation
- Select Improvement

PDCA/PDSA

- Plan
- Do
- Check/Study
- Act

5.2.10 FMEA (Failure Modes and Effects Analysis)

FMEA Steps

- Select a high-risk process and assemble a team.
- Diagram(ise) the process.
- Brainstorm potential failure modes
- Estimate the severity of the failure
- Estimate the probability of occurrence
- Estimate the probability of detection

Then

- Calculate the risk priority number
- Prioritize failure modes
- Identify contributing factors of failure modes
- Redesign process
- Analyse and test the new process

- Implement and monitor the redesigned process

5.2.11 FADE QI model

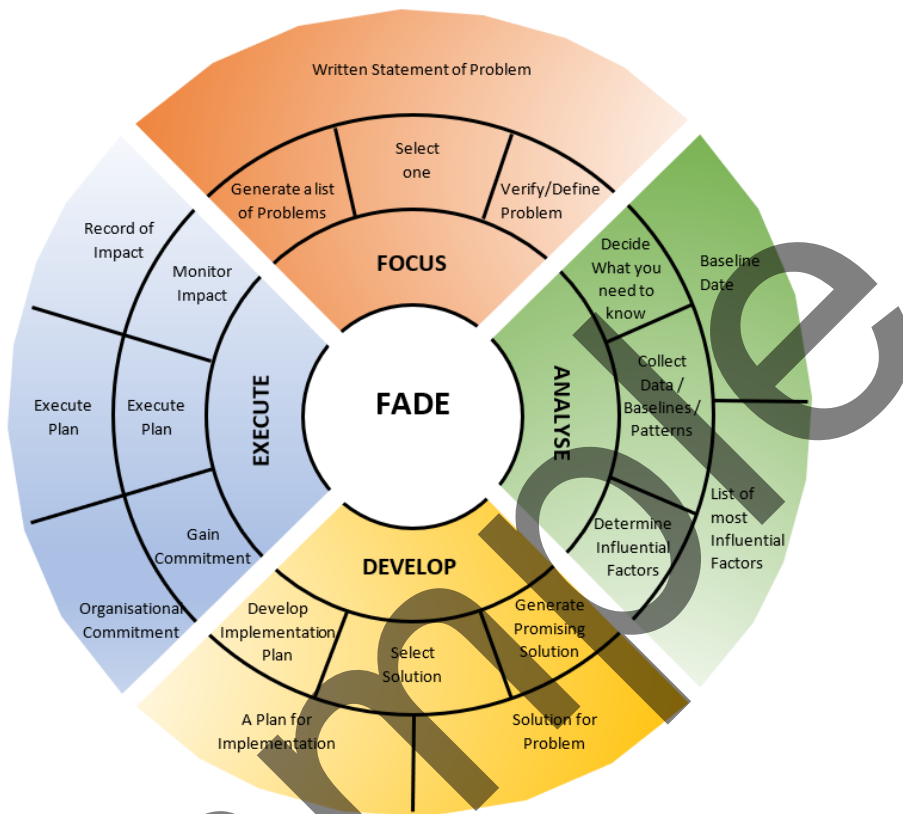


Figure 5:5 FADE – QI model

FADE QI model ☐ There are 4 broad steps to the FADE QI model: ☐ **FOCUS:** Define and verify the process to be improved ☐ **ANALYSE:** Collect and analyse data to establish baselines, identify root causes and point toward possible solutions ☐ **DEVELOP:** Based on the data, develop action plans for improvement, including implementation, communication, and measuring/monitoring ☐ **EXECUTE:** Implement the action plans, on a pilot basis as indicated, and ☐ **EVALUATE:** Install an ongoing measuring/monitoring (process control) system to ensure success.

37. Any Question

Notice that the planner has not had any involvement in work that is underway and almost all of the planner's activities have been directed toward work that will leverage his/her time. The only exception to this should be the small amount of time it took the planner to make a quick labour estimate on emergency work. A planner that follows this type of rigor can be assured that he/she is leveraging the entire maintenance crew by his/her efforts and helping to propel the organization to a more proactive state