

Managing Technology and Innovation to Sustain Competitive Success:
A Focus on Environment and Drivers for Innovation
A Practical Framework

by

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ABSTRACT

Purpose

Nowadays, technological innovation has become one of the most critical drivers of competitiveness. In this context, we will explain the drivers for managing technology and innovation to harness technological opportunities. These drivers include, but are not limited to, technological change, strategy for innovation, and sources of innovation.

Importance

The findings of this research will be of significant value to organizations that are looking to improve their technological innovation management capabilities. The research will provide organizations with a clear understanding of the key factors that contribute to effective management of the Environment and Drivers for Innovation, as well as illustrating how to manage these innovation drivers effectively.

Methods

The research will be conducted using a mixed-methods approach. A literature review will be conducted to identify the key factors that contribute to effective management of the Environment and Drivers for Innovation. Experts' opinions will be as valuable as other approaches to gain insights into how organizations are currently managing these drivers and to identify best practices.

Conclusion

The main output of this research is the new framework for managing technology and innovation as presented in figure 1.1. This study underscores the critical role of technological innovation in ensuring the competitiveness of modern organizations. Enabling this competitiveness involves understanding and managing the key drivers of innovation: technological change, strategy for innovation, and sources of innovation. Through a mixed-

methods approach, the paper highlights the imperative tools such as Analytic Hierarchy Process and various performance measures for managing technology and innovation within organizations. Furthermore, it asserts that identifying core capabilities and making accurate technology forecasts are both crucial elements of innovation strategy. The paper also emphasizes the significance of organizational structure and the importance of new product development teams as well as competitive strategies in facilitating innovation. Future study may be needed to delve into the other two groups of innovation drivers: Innovation Process, and Methods and Tools to support innovation, which could further pave the way for an effective and holistic innovation management framework. These findings and recommendations stand to benefit organizations seeking to improve their technological innovation capabilities, ultimately consolidating their competitive position in a rapidly evolving business landscape.

Literature Review

In today's competitive business environment, technological innovation plays a crucial role in the success and survival of organizations. To stay ahead in competition, firms need to effectively manage drivers of innovation. Most studies in this field were trying to explore the relationship between technology and innovation management, and competitive advantage. However, a gap has emerged since no one has provided a clear framework for effective management of technological innovation. This paper aims to look at the factors which if governed correctly will advocate better innovation management and sustain competitiveness. Next, it will explain each factor. Finally, an effort will be made to create a framework for managing technological innovation. After an intensive study, innovation drivers could be classified into three main groups: *Environment and Drivers for Innovation*, *Innovation Process*, and *Methods and Tools* to support innovation. This study only discussed the first group, Environment and Drivers for Innovation. The main aspects of the first group are

technological change, strategy for innovation, and sources of innovation namely customers and creativity.

For the second group, details on processes used for innovation should be studied to set up a clear framework to gain the long-term advantage of innovation management. They need to discuss different types of product development processes, product innovation charter, decision process using concept of Stage/Gate, and concept selection methods.

There are a range of tools that can be used to assist with the innovation process which needs to be discussed. To name a few, Quality Function Deployment (QFD), Failure Mode and Effects Analysis (FMEA), and Cause and Effect diagram.

To conclude, this literature review highlights the significance of creating a technological innovation management framework to better exploit technological opportunities as well as staying ahead of market competition. This can be achieved through one or more of the three main innovation drivers: *Environment and Drivers for Innovation*, *Innovation Process*, and *Methods and Tools to support innovation*. In this paper, only environment and drivers for innovation is presented. The other two groups of drivers required further exploration.

CHAPTER ONE: INTRODUCTION

In the past five years over one-third of the sales and profits of many companies are generated from products development (Schilling, 2020). However, in today's rapidly evolving business landscape technological innovation has emerged as a primary driver of competitiveness. Schilling (2020) defines **technological innovation** as “*The act of introducing a new device, method, or material for application to commercial or practical objectives*”.

Technology and innovation management aims to oversee the entire lifecycle of technology within an organization, from conception to implementation. Companies that effectively manage technology and innovation have a significant advantage in the market. This involves managing three major levels: *environment and drivers for innovation*, innovation process, and methods and tools to support innovations. Figure 1.1 illustrates the framework for managing technology and innovation inside organizations. Environment and innovation drivers will be discussed next which include technological change, innovation strategy, and sources of innovation.

TECHNOLOGY AND INNOVATION MANAGEMENT FRAMEWORK			
	1	2	3
Innovation Drivers	<i>Environment and Drivers for Innovation</i>	<i>Innovation Process</i>	<i>Methods and Tools to Support Innovation</i>
Dimensions	♦ Technological change - Analyzing industry structure - Identifying firm's core capabilities - Technology forecasting ♦ Strategy for innovation - Competitive strategies 1. low-cost strategy 2. broad differentiation strategy 3. focused strategy 4. best-cost strategy ♦ Source of innovation - Organizational structure - New product team	♦ New product process - Stage-Gate - Product Innovation Charter (PIC) ♦ Concept selection - Concept scoring - Concept screening	♦ Quality Function Deployment (QFD) ♦ Failure Mode and Effect Analysis (FMEA)

Figure 1.1: The framework for managing technology

Technological Change

Technological innovation plays a continuous role in shaping both businesses and society, leading to the rapid creation or extinction of entire industries. To exemplify, examine the transformations in the recorded music and camera industries over the past five decades. In this timeframe, the predominant technology shifted from vinyl records to eight-track tapes, then to cassette tapes, followed by compact discs, and eventually to MP3. However, the rise of mobile phones has rendered all these technologies obsolete, as these technologies have consolidated into a single, convenient device. **Technology** is defined as *the knowledge, procedures, instruments, and systems employed in the development of goods or the delivery of services*. While, **management of technology** is defined as *“the linking of different disciplines to plan, develop, implement, monitor, and control technological capabilities to shape and accomplish the strategic objectives of an organization”* (Schilling, 2020).

The influence of technology on businesses is not merely a direct cause-and-effect relationship; instead, the introduction of new technologies often triggers a series of interconnected changes within organizations. For instance, consider the information technology industry. One of the main principles of economy dictates that price is determined by supply and demand. However, technology has caused both an increase in demand and a decrease in prices. New technology has made more information available to consumers, increasing their awareness of product acquisition and usage opportunities. This results in heightened demand. However, more precise information also leads to a more systematic pricing approach. As a result, technology promotes better pricing. Similar patterns have emerged in other markets. Today, many people rely on the internet to make virtually every purchase. This has led to an increase in the number of buyers in many cases but also puts pressure on businesses to lower prices. To succeed in this environment, businesses must operate more efficiently. One of the primary ways a company achieves this efficiency is through technology.

Therefore, the utilization of technology in one area frequently necessitates technological advancements in other areas. Schilling (2020) has outlined three distinct reasons why individuals and organizations should pay attention to the management of technology. These are:

1. The rapid advancement of technology and the growing complexity of consumer preferences have led to shorter product life cycles. Consequently, organizations must adopt a more proactive approach in managing technology.
2. The rise in global competition necessitates that organizations enhance their competitiveness through the effective utilization of new technologies.
3. As technology changes, the management tools and techniques need to be changed as well.

There are vital decisions that arise when organizations aim to oversee technology. First of all, these decisions revolve around the strategic position the company intends to adopt. For instance, the company needs to decide whether it aspires to be a leader or a follower in its industry. While both options have their advantages, the choice will lead the company to undertake distinct measures and establish different processes and structures. Additionally, the company must decide whether to develop or acquire the technology. At the end, each of these strategic approaches comes with its own set of advantages and disadvantages, but the company must carefully assess both sides to make the right decision. Yet, to achieve success, decision-makers go beyond depending solely on their own assessment of the product's feasibility. Instead, they can manage technology through using techniques such as examine the structure of the industry, analyze the capabilities of the company, and prediction of future changes.

Strategy for Innovation

An organization's strategic focus should be guided by its unique capabilities. **Unique capabilities** *are the distinctive characteristics that enable an organization to thrive in the*

marketplace. In order to achieve market success, organizations are required to identify their core competencies and strategically align their core competencies to gain a competitive edge.

Innovation strategy refers to the plan or methodology by which an organization encourages and drives its innovation internally (Adams, 2005). It delineates the objectives, approaches, and resources essential for the generation and execution of novel ideas, products, processes, or services. This strategy encompasses activities such as pinpointing innovation opportunities, defining goals, allocating resources, fostering a culture that supports innovation, and establishing mechanisms for generating, evaluating, and implementing ideas. The overall goal of an innovation strategy is to secure a competitive edge, deliver value to customers, and propel the organization toward growth and success. The main competitive strategies a company can adopt are *a low-cost strategy, a broad differentiation strategy, a best-cost strategy, or a focused (market niche) strategy*.

Sources of Innovation

In today's dynamic and competitive landscape, innovation has become an indispensable driver of business success, but why? The accessibility of information, fueled by technological advancements, has increased consumer awareness of product opportunities. This leads to demanding more enhanced products and services at a faster pace and at lower costs. As a result, companies can no longer solely rely on price as their competitive advantage. Differentiation has become the key to survival, and innovation stands as the cornerstone of achieving this differentiation. Companies that adopt innovation are better equipped to meet the evolving needs of their customers and stay ahead of the curve in a rapidly changing market. Innovation can arise from different sources. For example, finding the optimal organizational structure is crucial for maximizing innovation. This means balancing exploration of fresh possibilities with effective utilization of existing resources. In addition, assessment of the innovation team's effectiveness in driving new ideas and results is key to sustained enterprise growth.

Research Structure

In chapter one, the research started with a brief introduction that defines some fundamental concepts, like technological change and strategy for innovation, contextualizes their significance in recent business trends, and outlines the thesis of the paper. After that, it started to discuss the innovation drivers. It begins with technological change in chapter three, this part provides an overview of the tools and techniques for managing technological change such analyzing industry structure, identifying firm's core competencies, and prediction of future technology changes. Then, strategy for innovation will be explained, this chapter highlights different competitive strategies, their applications, and implications in the context of innovation. The last chapter deals with key sources of innovation, including the organizational structure and the new product development team. It also discusses types of innovation, team characteristics, and a way to assess team effectiveness.

CHAPTER TWO: TECHNOLOGICAL CHANGE

Overview

New technologies can rapidly create or destroy entire industries. A case in point is Dr Pepper Snapple Group's Deja Blue water line exemplifies how technology can leverage companies if they manage them effectively. They meticulously optimized each stage of the process, eliminating waste and inefficiency. While none of the individual innovations are groundbreaking, their combined effect is significant. For instance, removing curves in the production line reduced product loss, while ninety-head filling machines maximized efficiency. Additionally, slight conveyor angles ensure upright bottle placement on pallets. Since 2007, Deja Blue bottles have used 35% less plastic and green ink technologies, further reducing waste and cost (White & Bruton, 2007). On the other hand, in 1998 Nokia dominated the market with their focus on small phones. However, by 2002, Samsung leapfrogged them by introducing color screens, pushing Nokia to the fourth position. Market leadership continued to shift, with camera phones becoming the new king in 2003. Today, smartphones like the iPhone and Google phone mark a new era. They are no longer just phones, but powerful digital devices offering a wide range of internet capabilities, transforming our mobile experience (White & Bruton, 2007).

The former two cases clarify the importance of managing technology. The three main reasons for managing technology as stated by (Schilling, 2020) are:

1. As technology advances faster and consumer preferences become more complex, product life cycles shrink, requiring organizations to be more proactive in managing technology.
2. Organizations must actively leverage the power of new technologies to sharpen their competitive edge in the face of rising global competition.

3. Technological change demands corresponding adjustments in management practices and tools.

Tools for Managing Technology

To achieve success, decision-makers should actively manage technology by examining the structure of the industry, analyzing the companies' capabilities, and technology forecasting, rather than solely relying on their own assessment of the product's feasibility.

Analyzing Industry Structure

A valuable tool for gathering and organizing crucial information within an industry is Michael Porter's Five Forces Analysis. This framework helps businesses understand the competitive landscape and identify potential opportunities and threats through analyzing five forces that adversely affect the profitability in any industry. These are: threat of new entrants, bargaining power of suppliers, bargaining power of buyers (customers), threat of substitutes, and competitive rivalry, as presented in figure 2.1 (Case et al., 2011).

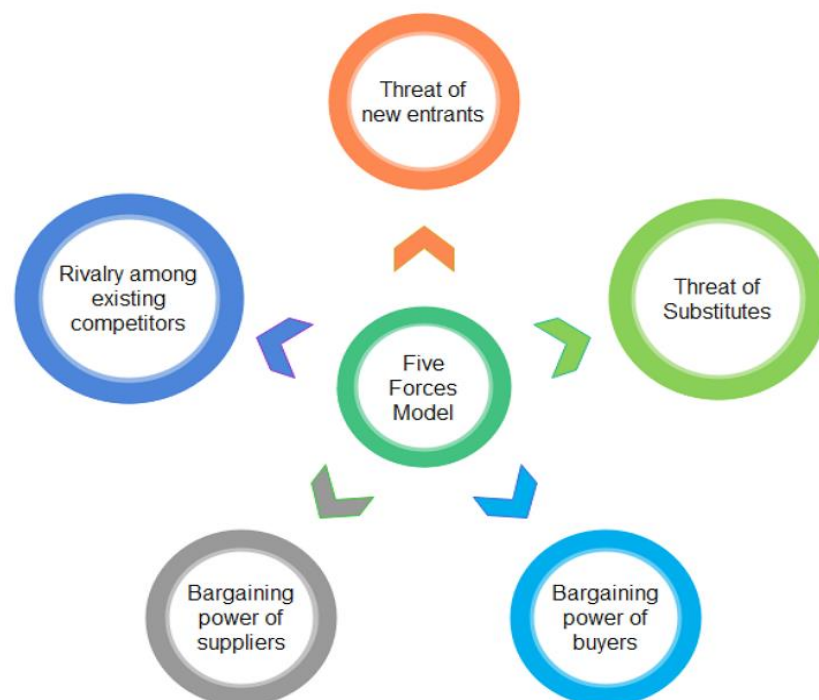


Figure 2.1: Porter's Five Forces Diagram (Porter, 2008, p. 27)

1. Threat of New Entrants. Low barriers to entry attract competition, who undercut prices and offer innovative alternatives. On the other hand, high barriers to entry can limit the number of competitors, potentially contributing to a more stable and predictable profit environment within the industry. Existing firms' reaction can play a significant role in influencing the success of new entrants. Through strategic investments in market structures, firms can create conditions that discourage potential new entrants. By venturing into unexplored market niches, firms strategically fill the gaps, leaving no space for potential rivals to squeeze through and challenge their dominance.

Questions an organization might ask during the analysis process include:

- What financial hurdles await new entrants in this industry?
- How long would it take a new competitor to enter this market?
- Is there a significant risk of customer attrition if a new player enters the market?
- Can other companies easily replicate your key technology?

2. Power of Suppliers. The role of suppliers is to furnish the necessary inputs that enable the industry to generate its ultimate output (Case et al., 2011). That means, suppliers are the backbone of the industry, they deliver the tools, materials, and skilled personnel that bring its products to life.

Questions an organization might ask during the analysis process include:

- Who are the primary vendors/ suppliers?
- Do you have diverse suppliers to choose from?
- What are the potential risks involved in transitioning to a new supplier?

3. Power of Buyers. The individuals or entities who acquire your goods or services are ultimately your customer base. Increased buyer bargaining power can lead to downward pressure on prices. Thus, companies need to focus on characteristics that shape the buyer

strength. These attributes are: The buyer's procurement volume, costs of shifting to competing brands, and is there a wide range of sellers to choose from?

Questions an organization might ask during the analysis process include:

- Could you describe the buyer-to-seller ratio in your industry?
- Is your income heavily reliant on a small group of customers?
- What is the typical order volume range for your business?

4. Threat of Substitute Products or Services. Substitutes are products or services that perform a similar function but in a different way. The marketplace is no longer defined by neatly delineated industries; firms must now be mindful of the potential disruption posed by substitutes from diverse corners of the economy. For example, in the travel industry, airlines have adopted online booking platforms, bypassing the need for intermediaries like travel agents, streamlining the customer experience and potentially reducing costs. Thus, the threat of substitution from diverse sectors creates a competitive landscape where price power is ultimately limited by the value proposition offered by each industry.

Questions an organization might ask during the analysis process include:

- How diverse is the landscape of alternative solutions for product/service within your industry?
- What unique value proposition sets your product apart from similar solutions in the market?
- Are similar products affordable?

5. Competitive Rivalry. Intense competition within an industry often leads to price reductions, potentially eroding profit margins unless countered by advancements in process technology or other strategic initiatives. Profit increases when competitive intensity within an industry decrease.

Questions an organization might ask during the analysis process include:

- What is the estimated number of your competitors?
- Who are your key players?
- Are there any obstacles that might discourage customers from choosing a competitor over your services? What are they?
- Is the industry expanding or shrinking?

Identifying Firm's Core Capabilities

(Hafeez et al., 2002) developed framework called *Analytic Hierarchy Process (AHP)* which is designed to pinpoint the most essential capabilities of a firm. He claims that effective capabilities arise from the synergy between individual assets, where coordinated activities and processes act as conduits for collective learning and knowledge sharing. In his study, he defines **capabilities** as “*the ability to make use of resources to perform some task or activity*” (Hafeez et al., 2002, p. 40). In addition, he clearly stated that resources could be **tangible** or **intangible**. In his model, he classifies resources into three groups: physical assets, intellectual assets, and cultural assets. The AHP model is illustrated in figure 2.2.

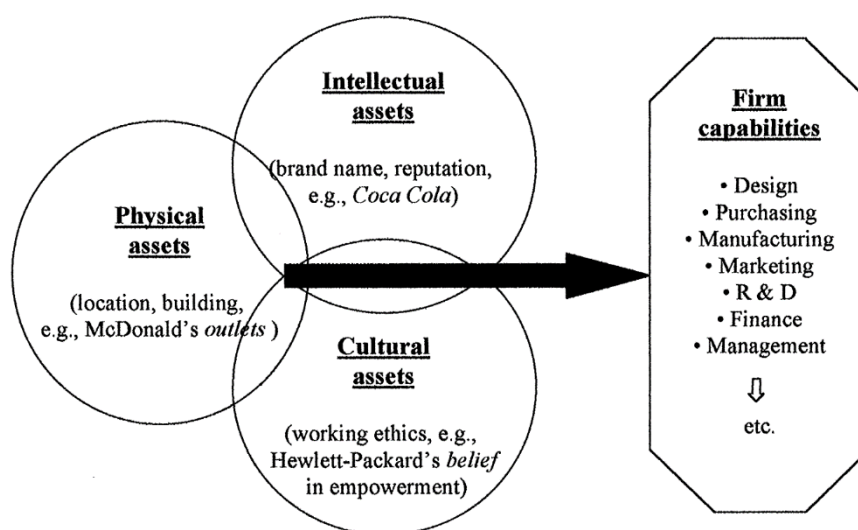


Figure 2.2: Relationship between assets and capabilities (Hafeez et al., 2002, p. 40)

Beyond tangible resources, a firm's capabilities can also be built upon established routines, which represent proven solutions to recurring problems encountered in the firm's operations. A firm's routines are not static entities, but rather dynamic products of its accumulated history, repeated experiences, and the ongoing process of collective learning. One notable example can be found in Toyota's just-in-time manufacturing system, which optimizes production processes and minimizes waste.

core competence must have two salient characteristics: firstly 'valuable' to business, and secondly 'unique' in competition. A true core competence must have two attributes: valuable to business and unique in competition. Valuable means that the essential capabilities of a company must play a vital role in achieving the business goals of the organization. While unique entails the idea that these competencies must distinguish themselves in a competitive environment.

The framework is composed of three main steps:

Step 1: Identifying key metrics to assess the effectiveness of firm capabilities and mapping those capabilities to their strategic contribution.

Step 2: Using AHP to evaluate performance contributions.

Step 3: Identifying core capabilities.

Identifying key metrics to assess the effectiveness of firm capabilities and mapping those capabilities to their strategic contribution

Effective performance measures should be strategically aligned, directly reflecting the organization's objectives, and guiding its path forward. For instance, different business strategies (e.g., cost leadership) necessitate distinct sets of performance measures (e.g., market share) to effectively assess their success. On the other hand, effective mapping of capabilities requires management to possess a deep understanding of the intricate workings of their business processes and activities.

Using AHP to evaluate performance contributions

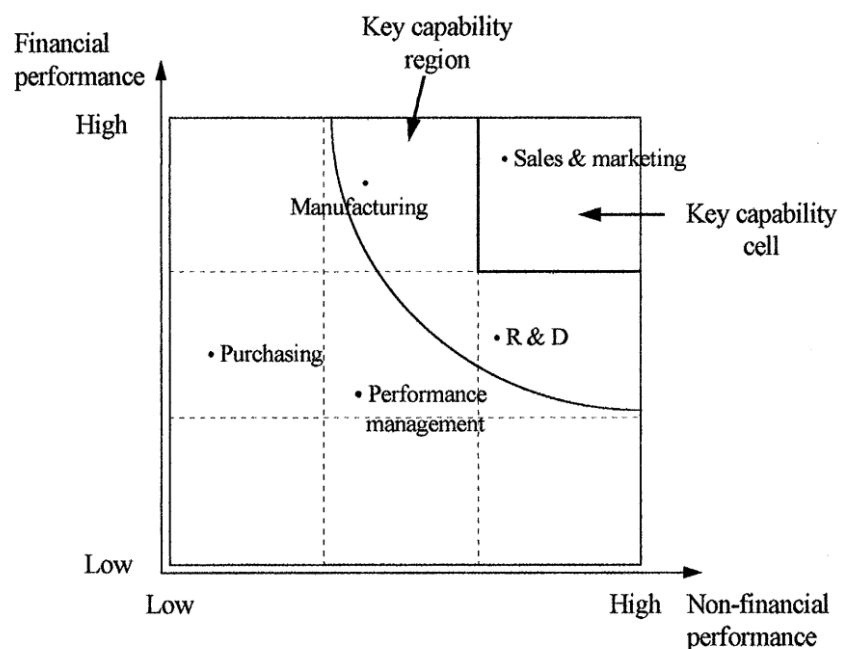
AHP is a suitable approach for undertaking quantitative as well as qualitative analysis. The model adopts a holistic approach, using a balanced scorecard of both financial and non-financial performance measures for a comprehensive assessment. The AHP framework based on four key principles.

1. *Decomposition*— Breakdown the complex problem into small manageable levels. Then, each layer is further disassembled and so on.
2. *Prioritization*— Contains comparison of individual elements within a level, considering their relationship to a more general element from the preceding level.
3. *Synthesis*— Comprehensive evaluation of all options.
4. *Sensitivity analysis*— The sensitivity of the optimal choice is analyzed to ensure its stability and viability.

Identifying core capabilities

To identify the most critical capabilities, the AHP model evaluation results are visually mapped onto a two-dimensional matrix for comprehensive analysis as shown on figure 2.3.

Figure 2.3: Identifying core capabilities (Hafeez et al., 2002, p. 46)



The top right-hand corner of the matrix pinpoints the capability options that exhibit exceptional performance across both financial and non-financial metrics, making them prime candidates for further investment or prioritization. Clearly, the capabilities represented in this cell are demonstrably crucial drivers of organizational performance and competitive advantage.

Technology Forecasting

Technology forecasting anticipates the direction and rate of technology change. Thus, it facilitates decision making on managerial issues, such as setting priorities, resource allocation and risk reduction for technology development. Prediction of future changes in technology can provide detailed and practical insights into future technology trends and play an important role in R&D management, including strategy formulation (Durmusoglu, 2018).

Technology forecasting is defined as *the process of predicting the future development and impact of technologies*. It involves analyzing current trends, technological advancements, and market dynamics to make informed predictions about the future of technology. Additionally, it helps organizations and policymakers make strategic decisions, allocate resources, and identify emerging opportunities and risks.

Technology forecasting is an essential aspect of technology assessment. It involves attempting to predict the future development and impact of technologies. Forecasting is used to understand how a technology may evolve, its potential benefits and risks, and its implications for society and the environment. It helps decision-makers make informed choices about technology adoption and policy measures. In technology assessment, forecasting is used in several ways. Firstly, it focuses on predicting the development and performance of a specific technology, as well as its competitors and complementary technologies. This helps assessors understand the potential trajectory of a technology and its implications.

Secondly, forecasting includes social, economic, and political forecasting. This aims to anticipate the future context in which the technology will operate, including societal attitudes,

economic conditions, and regulatory frameworks. By considering these factors, assessors can better understand the potential impacts and consequences of a technology.

Lastly, it involves predicting the wide range of effects that a technology might cause, both obvious and less obvious. This includes identifying potential benefits, risks, unintended consequences, and side effects. By considering these effects, assessors can provide decision-makers with a more comprehensive understanding of the technology's potential outcomes. It is important to note that forecasting is inherently uncertain and prone to error.

(Braun, 1998) identifies various methods and approaches used in technology forecasting, including:

1. *Extrapolation*— This method involves projecting future trends based on historical data and patterns. It assumes that the future will follow a similar trajectory as the past.
2. *Expert opinion*— Experts in a particular field are consulted to gather their insights and predictions about future technological developments. The Delphi method is a well-known approach that aims to obtain a consensus among experts.
3. *Scenario planning*— This method involves creating multiple scenarios or alternative futures based on different assumptions and variables. It helps to explore different possibilities and assess the potential impact of each scenario.
4. *Dominant technologies*— Technology forecasting often focuses on identifying the most active and important technological fields, known as dominant technologies. These fields are expected to have significant advancements and impact in the future.

5. *Market forecasts*— In addition to technological advancements, technology forecasting may also consider market forecasts to understand the demand and adoption of technologies in the future.

CHAPTER THREE: STRATEGY FOR INNOVATION

Overview

Technology-driven companies ultimately aim to generate value for themselves and their stakeholders. A sustainable competitive strategy is the most effective way for a company to create long-term value. The company's competitive strategy encompasses the set of business initiatives employed to attract customers, exceeding their expectations, while simultaneously resisting competitive forces and solidifying its market position.

According to (Schilling, 2020) the primary distinctions between competitive strategies are defined by two key dimensions: (1) the breadth of the company's target market and (2) the pursuit of a competitive advantage based on either low costs or product differentiation. These two factors lead to five different ways companies can choose to compete, as shown in figure

3.1. The five innovation strategies are:

1. *A low-cost strategy*— Aiming to achieve lower overall costs than competitors on analogous products appealing to a wide range of customers, typically through underpricing rivals.
2. *A broad differentiation strategy*— Endeavoring to distinguish the company's product offerings from those of competitors by presenting superior attributes that will resonate with a diverse range of buyers.
3. *A focused low-cost strategy*— Focusing on a specific market niche and exceeding rivals in cost efficiency, thereby enabling the company to offer its products and services to niche members at a lower price point.
4. *A focused differentiation strategy*— Focusing on a specific market segment and surpassing competitors by providing niche members with customized features and attributes that cater to their unique preferences and needs to a superior degree.
5. *A best-cost provider strategy*— Delivering exceptional value to customers by exceeding their expectations on key quality, features, performance, and/or service attributes while simultaneously undercutting their price expectations. This hybrid strategy combines elements of cost leadership and differentiation,

aiming to achieve the lowest (best) costs and prices within the segment of sellers offering comparable differentiated products.

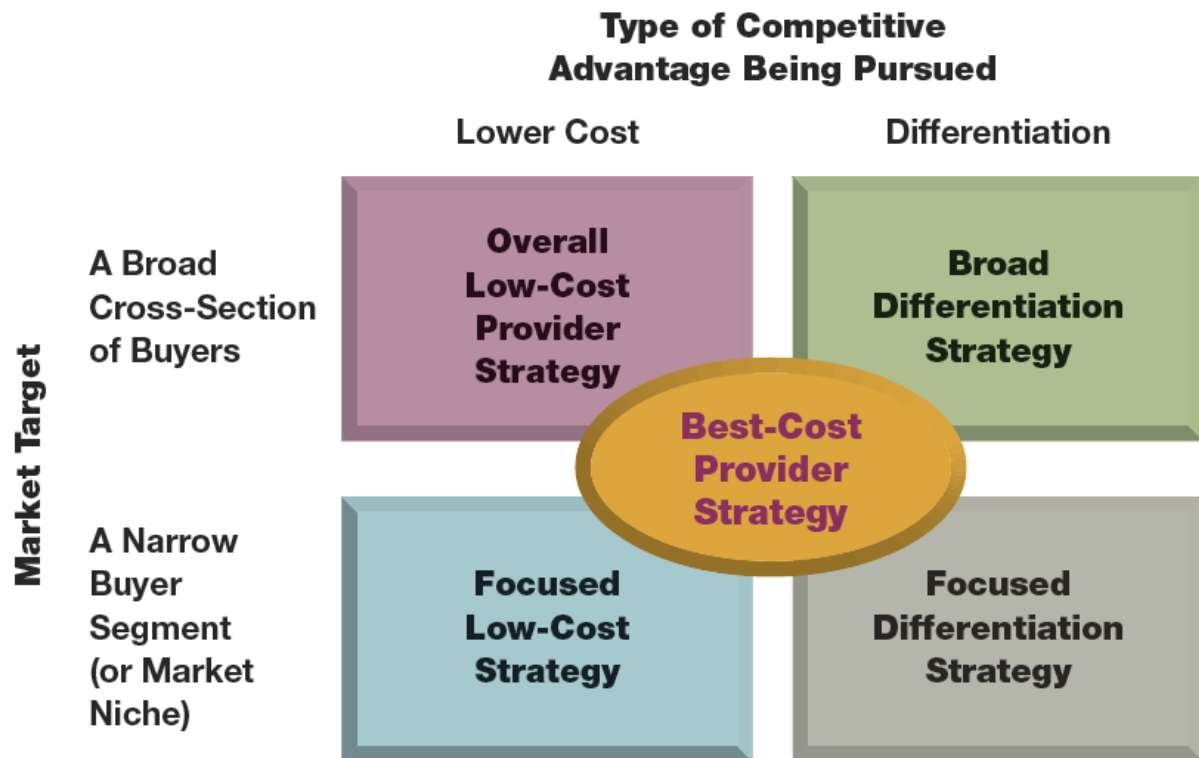


Figure 3.1: The Five Generic Competitive Strategies (Thompson, 2015, p. 118)

The Competitive strategies

1. Low-Cost Strategy

Low-cost strategy means that a company needs to keep its total costs across all business operations (its value chain) lower than its competitors' to be cheaper and have a cost advantage. This strategy works best when price competition is vigorous, Product homogeneity is high, product differentiation is a challenge, or switching costs for buyers between sellers are minimal. (Thompson, 2015) finds that this can be achieved by either: (1) Managing and controlling the important cost drivers, and/or (2) Continuously analyzing and improving the value chain activities to identify and eliminate unnecessary costs. He reports that a company should pay attention to ten vital cost drivers that significantly impact company's costs and offer opportunities for cost reduction as shown in figure 3.2. The author insists that implementing e-

business solutions, adopting direct sales models, and streamlining product design are key strategies for companies to achieve cost advantages through value chain reconfiguration.

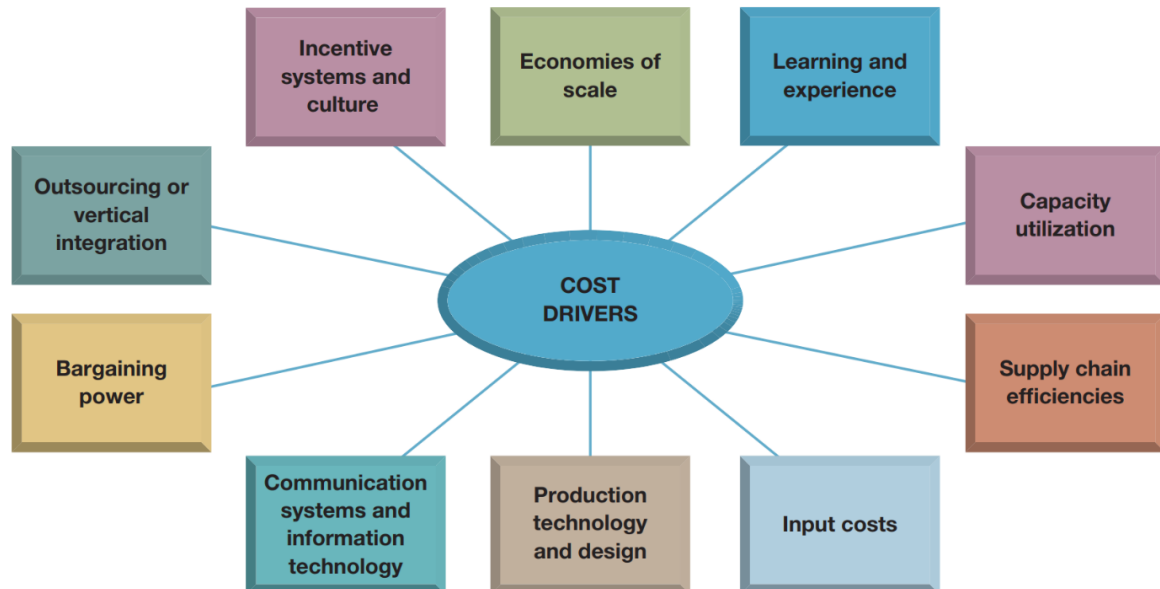


Figure 3.2: Cost Drivers: The Keys to Driving Down Company Costs (Thompson, 2015, p. 120)

2. *Differentiation Strategy*

When buyer requirements are widely varied, a standardized product approach is inadequate, and differentiation strategies become a must. Effective differentiation strategies require careful study to determine the specific attributes that buyers perceive as most desirable, valuable, and financially justifiable. However, Differentiation strategies are ineffective when buyers fail to perceive significant value in the brand's unique offerings, or when the chosen differentiation approach is not sustainable in the face of competitive imitation. (Thompson, 2015) recommended that organizations should focus on the eight major drivers to create differentiation as shown in figure 3.3. These value drivers are:

1. *Product features and performance*— this concept includes both physical characteristics and functional attributes of a product, incorporating features that enhance user safety or promote environmental sustainability.

2. *Customer services*— superior customer service, such as efficient delivery, returns, and after sale services, can be equally impactful in establishing differentiation as possessing superior product features.
3. *Production R&D*— *offering* products tailored to individual needs can really give a company an edge over rivals.
4. *Technology and innovation*— *the* implementation of this strategy can result in a sustained first-mover advantage for a company, allowing it to retain its competitive edge in the long run.
5. *Quality improvement*— quality control builds better products that last longer, work better, and look nicer, boosting customer satisfaction and reputation.
6. *Employee skill, training, experience*— *a* company with a robust intellectual capital base frequently possesses the capacity to generate groundbreaking ideas that propel product innovation, foster technological advancements, enhance product design and performance, refine production techniques, and ultimately elevate product quality.
7. *Sales and marketing*— bands that successfully cultivate customer loyalty establish a psychological barrier associated with switching to another product, effectively increasing the perceived "cost" of such a decision.

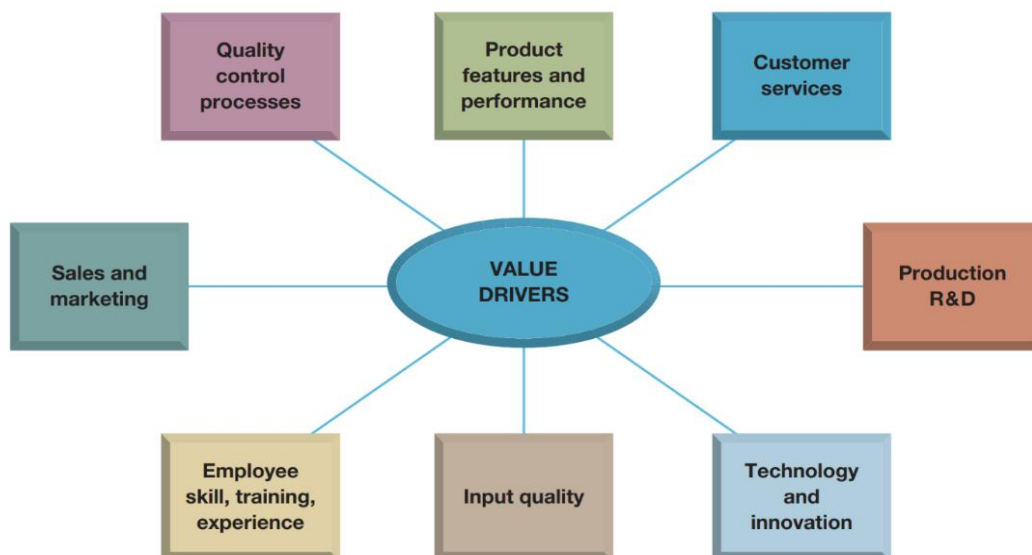


Figure 3.3: Value Drivers: The Keys to Creating a Differentiation Advantage (Thompson, 2015, p. 127)

Differentiation strategies achieve optimal effectiveness in market environments characterized by:

- A high degree of diversity in buyer needs and uses of the product.
- The implemented differentiation strategy is not commonly replicated by rival.
- Technology is evolving so quickly that companies are constantly scrambling to stay ahead of competitors by offering the newest and coolest features.

3. *Best-Cost Strategy*

The best-cost strategy is designed to maximize customer value by exceeding expectations on key quality attributes while maintaining affordability. Unlike low-cost providers who focus on offering basic products without extras to keep prices down, best-cost providers offer additional features and benefits at a slightly higher price. It is most effective in markets characterized by a prevailing culture of product differentiation, where a significant segment of value-conscious buyers can be persuaded to purchase mid-range products rather than opting for either the inexpensive basic products or the high-priced top-of-the-line offerings.

4. *Focused (Market Niche) Strategy*

Unlike low-cost and differentiation strategies which appeal to everyone, a focused strategy concentrates on a small segment of the market. The target segment can be identified through geographic boundaries, specialized needs in product application, or exclusive product attributes that resonate with a niche buyer. It seeks to dominate the niche by providing a superior customer experience than any competitor within that specific market segment.

Focused strategy is classified into two main types. First, a focused strategy based on low-cost, which depends on the identification of a buyer segment whose needs can be met at a lower cost compared to the overall market. Second, a focused strategy based on differentiation that relies on a segment willing to pay a premium for unique product attributes that enhance

their experience or fulfill their specific needs. Table 3.1 presents a summary of the competitive strategies.

	Low-Cost Provider	Broad Differentiation	Focused Low-Cost Provider	Focused Differentiation	Best-Cost Provider
Strategic target	A broad cross-section of the market.	A broad cross-section of the market.	A narrow market niche where buyer needs and preferences are distinctively different.	A narrow market niche where buyer needs and preferences are distinctively different.	- Value-conscious buyers. - A middle-market range.
Basis of competitive strategy	Lower overall costs than competitors.	Ability to offer buyers something attractively different from competitors' offerings.	Lower overall cost than rivals in serving niche members.	Attributes that appeal specifically to niche members.	Ability to offer better goods at attractive prices.
Product line	A good basic product with few frills (acceptable quality and limited selection).	Many product variations, wide selection; emphasis on differentiating features.	Features and attributes tailored to the tastes and requirements of niche members.	Features and attributes tailored to the tastes and requirements of niche members.	Items with appealing attributes and assorted features; better quality, not best.
Production emphasis	A continuous search for cost reduction without sacrificing acceptable quality and essential features.	Build in whatever differentiating features buyers are willing to pay for; strive for product superiority.	A continuous search for cost reduction for products that meet basic needs of niche members.	Small-scale production or custom-made products that match the tastes and requirements of niche members.	Build in appealing features and better quality at lower cost than rivals.
Marketing emphasis	- Low prices, good value. - Try to make a virtue out of product features that lead to low cost.	- Tout differentiating features. - Charge a premium price to cover the extra costs of differentiating features.	Communicate attractive features of a budget-priced product offering that fits niche buyers' expectations.	Communicate how product offering does the best job of meeting niche buyers' expectations.	Emphasize delivery of <i>best value for the money</i>.
Keys to maintaining the strategy	- Economical prices, good value. - Strive to manage costs down, year after year, in every area of the business.	- Stress constant innovation to stay ahead of imitative competitors. - Concentrate on a few key differentiating features.	Stay committed to serving the niche at the lowest overall cost; don't blur the firm's image by entering other market segments or adding other products to widen market appeal.	Stay committed to serving the niche better than rivals; don't blur the firm's image by entering other market segments or adding other products to widen market appeal.	Unique expertise in simultaneously managing costs down while incorporating upscale features and attributes.
Resources and capabilities required	- Capabilities for driving costs out of the value chain system. <i>Examples:</i> large-scale automated plants, an efficiency-oriented culture, bargaining power.	- Capabilities concerning quality, design, intangibles, and innovation. <i>Examples:</i> marketing capabilities, R&D teams, technology.	- Capabilities to lower costs on niche goods. <i>Examples:</i> lower input costs for the specific product desired by the niche, batch production capabilities.	- Capabilities to meet the highly specific needs of niche members. <i>Examples:</i> custom production, close customer relations.	- Capabilities to simultaneously deliver lower cost and higher-quality/ differentiated features. <i>Examples:</i> TQM practices, mass customization.

Table 3.1: Summary of the competitive strategies (Thompson, 2015, p. 139)

CHAPTER FOUR: SOURCES OF INNOVATION

Overview

As a starting point a company needs to gain a quick understanding of the current situation of their innovation sources. These are organizational structure, and new product development team.

Organizational structure

Choosing the right structure of an organization is considered as an important source of innovation success. It requires an enterprise to utilize structures that enable them to explore new opportunities as well as exploiting their existing capabilities. Furthermore, types of innovation are vital factors that should be linked to the organizational structure to maximize its profit.

(Davenport et al., 2006) reported three types of innovation. Firstly, *incremental innovations*, which are small enhancements to products and processes that boost efficiency and customer value. Secondly, *architectural innovations*, which refers to using technology or new processes to completely transform part of the business. Finally, *discontinuous innovations*, these are transformative technological advancements that necessitate a paradigm shift in industry practices, leading to the obsolescence of old products.

Each innovation type has its own target, some may address a firm's existing customers while others aim at a new market. An enterprise can use the *map of innovation* as in figure 4.1, which is created by (Davenport et al., 2006), to find the correlation between innovation types and their customer targets.

	Incremental innovations small improvements in existing products and operations	Architectural innovations technological or process advances to fundamentally change a component or element of the business	Discontinuous innovations radical advances that may profoundly alter the basis for competition in an industry
New customers			
Existing customers			

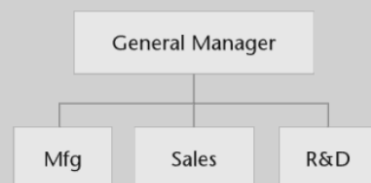
Figure 4.1: A Map of Innovation (Davenport et al., 2006, p. 4)

Types of organizational structure

A research done by (O'Reilly & Tushman, 2011) on 15 businesses in 9 district industries studied the variant structures that used by companies in their breakthrough projects. The study concluded that most companies use one of four structures to manage and launch their innovations. Figure 4.2 illustrates the common types of organizational structures that are used by most of the businesses. The survey results show that success rate for those companies who used the ambidextrous structure is more than 90%, while 25% is assigned for those using the functional design. Notably, organizations using the cross-functional or unsupported teams are strongly failed to success in their innovations.

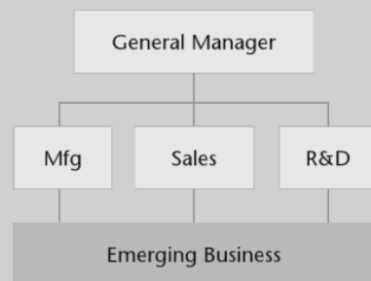
Organizing to Innovate

In our examination of 35 different attempts at breakthrough innovation, we discovered that businesses tend to apply one of four organizational designs to develop and deliver their innovations. More than 90% of those using the ambidextrous structure succeeded in their attempts, while none of the cross-functional or unsupported teams, and only 25% of those using functional designs, reached their goals.



Functional designs

integrate project teams into the existing organizational and management structure



Cross-functional teams

operate within the established organization but outside the existing management hierarchy



Unsupported teams

are set up outside the established organization and management hierarchy

Ambidextrous teams that are structurally independent units. Each having its own processes, structures, and cultures, but are integrated into the existing management hierarchy



Figure 4.2: The Four Types of Organizational Structure (O'Reilly & Tushman, 2011, p. 5)

New product development team

To enhance performance, enterprises must first determine their baseline by assessing their team's capabilities. This can be done by identify the key characteristics of successful innovation teams and evaluate the current position of the innovation team.

In this section, we will explore various aspects influencing the success of new product development teams, including their size, structure, organization, management, and leadership. Then we will present a team evaluation checklist.

Team characteristics

- *Team size*— the size of new product development teams varies greatly, ranging from a handful of individuals to hundreds of collaborators. For example, the team behind the IBM personal computer consisted of just 19 members, while the average project team at IBM involves roughly 200 individuals (Schilling, 2020). A research don by (Devine et al., 1999) concluded that in the U.S. teams generally consist of around 11 members.
- *Team composition*— miscommunication among different departments of a company can be extremely damaging to new product development. Firms can address the issue of communication by establishing cross-functional teams.

Cross-functional teams *are teams composed of experts from various departments within the company, such as R&D, marketing, manufacturing, and distribution* (Schilling, 2020).

- *Team structure*— The way teams are structured significantly impacts their effectiveness and ability to achieve goals. (Wheelwright & Clark, 1992) classified teams into four types: functional, lightweight, heavyweight, and autonomous as shown in figure 4.3.

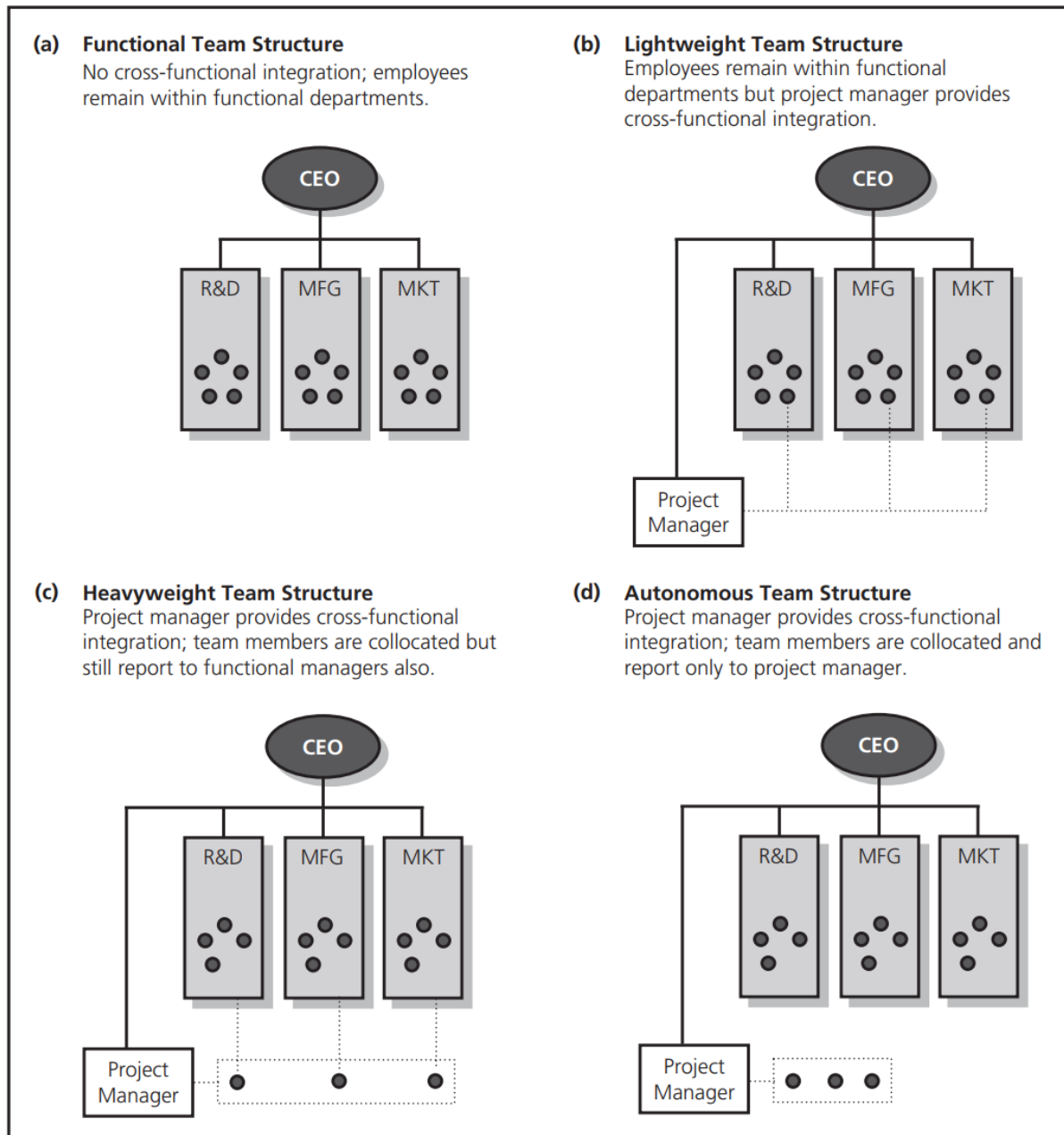


Figure 4.3: Types of team's structure (Wheelwright & Clark, 1992, p. 265)

Characteristics	Functional Team	Lightweight Team	Heavyweight Team	Autonomous Team
Project manager	None	Junior or middle manager	Senior manager	Senior manager
Power of project manager	NA	Low	High	Very high
Time spent on team activities	Up to 10%	Up to 25%	100%	100%
Location of team members	Functions	Functions	Collocated with project manager	Collocated with project manager
Length of commitment to team	Temporary	Temporary	Long-term but ultimately temporary	Permanent
Evaluation of team members	Functional heads	Functional heads	Project manager and functional heads	Project manager
Potential for conflict between team and functions	Low	Low	Moderate	High
Degree of cross-functional integration	Low	Moderate	High	High
Degree of fit with existing organizational practices	High	High	Moderate	Moderate-low
Appropriate for:	Some derivative projects	Derivative projects	Platform projects/ breakthrough projects	Platform projects/ breakthrough projects

Table 4.1.: Summary of Characteristics of Team Types (Wheelwright & Clark, 1992, p. 267)

Team assessment

Use the checklist in table 4.2 to evaluate the current state of the team. Use the Red-Amber-Green (RAG) legends to assess your agreement with the statement in each criterion. Where Red indicates strong disagreement and highlights significant issues requiring immediate response, Amber signifies areas of concern and potential risk, and Green signifies complete agreement and suggests no immediate concern.

ID	CATEGORY	EVALUATION CRITERIA	STATUS
1	Leadership	Driving innovation is a key strategic objective, spearheaded by a senior executive and actively promoted throughout the organization at all management levels	☐ R ☐ A ☐ G
2	Strategic focus	the organization has established a clear vision for innovation, prioritizing customer needs and fostering a collaborative approach across all levels.	☐ R ☐ A ☐ G
3	Internal sources of ideas	A dedicated budget and ample time are provided to support the internal development of breakthrough ideas. These ideas are then meticulously compiled within a centralized database.	☐ R ☐ A ☐ G
4	External challenges	Continuous market awareness is achieved through careful monitoring of industry trends, comprehensive analysis of key competitors, and a dedicated research process that keeps market insights current.	☐ R ☐ A ☐ G
5	Idea evaluation	All ideas are rigorously evaluated through a structured screening process based on predetermined criteria, guaranteeing alignment with key business objectives	☐ R ☐ A ☐ G
6	Projects and implementations	Innovation initiatives are implemented using proven project management methodologies, equipped with adequate resources and funding, and strategically address potential challenges and risks.	☐ R ☐ A ☐ G
7	Supporting systems	Leveraging a common web-based tool, the organization boosts visibility and control over its innovation portfolio, promotes process consistency among teams, and fosters a spirit of continuous learning.	☐ R ☐ A ☐ G
8	Innovation champions	Across the organization, every team boasts "innovation champions" with clearly defined roles, equipped with the necessary time and expertise to spearhead innovative initiatives.	☐ R ☐ A ☐ G
9	Creative cultures	The organization cultivates a culture where creative challenges are welcomed, mistakes are learning opportunities, and individuals are empowered to actively participate in the exciting journey of innovation	☐ R ☐ A ☐ G
10	Performance management	Through collaborative efforts, the organization has established a robust innovation framework with clear performance metrics, a defined review process, and a shared culture of learning and improvement	☐ R ☐ A ☐ G

Table 4.2: Team assessment (Bruce & Birchall, 2012, p. 18)

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