

Research Article

The Influence of Lifecycle in Shaping the Underlying Project Portfolios in the High-Technology Market

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Abstract

High-technology markets have a tendency to be extremely dynamic, undergo periods of rapid market growth, and exhibit market-based developments that align with a firm's lifecycle, which is generally based upon the influence(s) exerted upon them by innovation within the market space. Likewise, how firms navigate the market will depend on the types of innovation(s) they experience, their corporate size, the amount of time spent within selected market positions, and the projects they ultimately implement. These various elements will ultimately shape how a firm manages projects and its associated organizational structures. The question is how managers do and entrepreneurs know what to do in the face of periods of changing market conditions? This paper explores the rational underlying the change from agile early start-up companies that grow and mature into increasingly rigid organizational structures that influence the types of projects as the firms progress along the high-tech lifecycle. The type and attitude of customers also evolves through time and this also has to be taken into consideration as each stage of the lifecycle will have customers with different drivers and requirements influencing their purchasing decisions. This paper uses the Lifecycle Theory to analyze this phenomenon and explain how and why this evolutionary process occurs within the market, including the factors and characteristics associated with projects during various market phases throughout the lifecycle. Ultimately, this exploration illustrates the evolutionary process firms undergo in relation to the implementation of innovation strategies within high-tech market spaces. The implications to industry include enabling entrepreneurs and managers to recognize and react to the complexity of the multi-dimensional changes in the market, strategically plan their next steps for their company's project management approach, product development, portfolio development, and to gain insight to competitor's actions.

Keywords

Innovation Evolution, Lifecycle, Project Alignment, Strategic Innovation Strategies, Market Dynamics, High-Tech Markets, Project Management, Project Organizational Structures

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1. Introduction

Typically, the individual segments of high-tech markets follow a similar trajectory as the lifecycle of all firms, which begin at market entry and end with market exit. The types of innovation(s) that firms experience and utilize will likewise evolve as firms progress within the market. Within all markets, but especially in high-tech markets, the behavioral dynamics associated with firms are shaped by their underlying customer base, its succession of market-based profiles during lifecycle progression [1, 2], and the manner which firms respond to consumer behavior. These variables ultimately influence how firms implement their strategies and navigate the market, which corresponds with the natural evolution defined by the Lifecycle Theory in the second section of this article. To contend with the potential market instability that can result from ever-developing market circumstances, a firm's management structures must take into account the reasons why changes within the market have occurred and identify potential non-alignments with current strategies. This article does not differentiate between the methodologies of agile, waterfall, or hybrid project delivery as we posit that the firm's approach to the system used will be appropriate for the market and product being designed, produced, and sold. This article looks at how the internal organizational structure and external market conditions impact the strategies and decision making within the firm.

2. An Overview of the High-Tech Lifecycle and the Consumers

The lifecycle model imposes rigorous discipline upon virtually all market-based behaviours of every market participant throughout their market progression, from a firm's entry to its eventual exit. Regardless of market space firms occupy they will generally follow a similar trajectory where firms experience periods of rapid market growth to gradual stagnation and eventual market exit. This trajectory will begin with rapid market growth during early market phases, followed by declining profit margins as firms progress within the market, and then firms will eventually experience a shake out once they enter a mature market phase, which refers to periods where weaker rival competitors are forced out of the market [3].

A firm's relationship with its customer segment will also heavily influence its progression within the market [1]. Firms within early high-tech market segments will usually work with technology enthusiasts and visionaries to help refine their prototype products and services. These enthusiasts will help with refinements as these individuals tend to dominate the early high-tech market segment(s) and, as such, can provide valuable insights given their continuous presence and pursuit of innovative products and services. These client groups are as technology inclined as the firm.

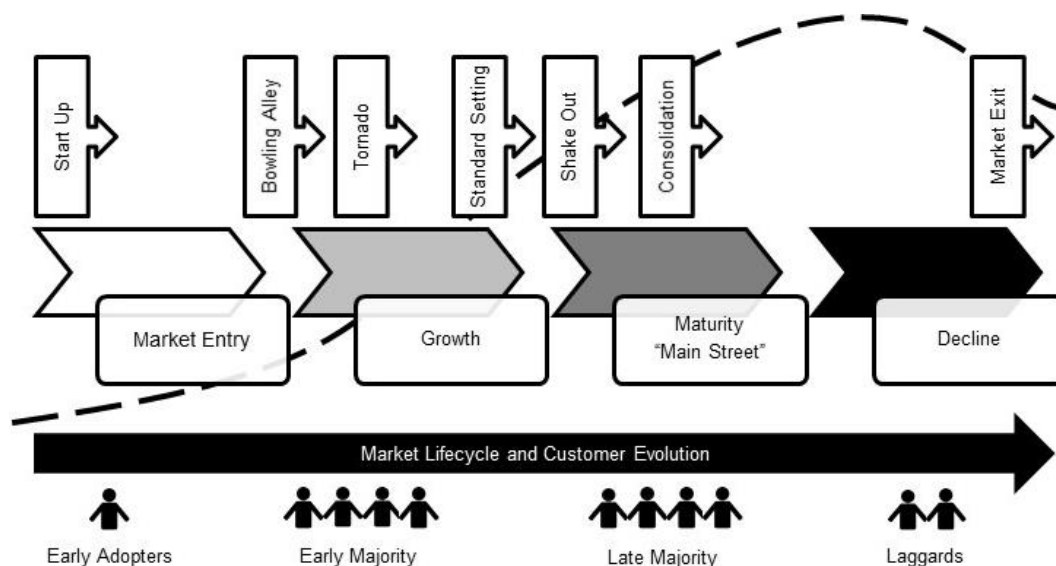


Figure 1. Market Dynamics and Customer Base (adapted from [1]).

These technology enthusiasts and visionaries at the early market phase will generally be fairly immune to price fluctuations, and highly prioritize cutting-edge innovative products and services as well as their potential future performance. Please refer to Figure 1 for further information about the distribution of the various consumer groups in the customer base as a bell curve. In the same vein, the conditions within

early market phases tend to also attract relatively high risk-tolerant firms given the potential for them to achieve substantial profit margins with relatively low entry expense. Firms can also be enticed to enter early market phases given the high probability for them to experience periods of high market growth, the capability to realign their market position with relative ease, and the ability to conduct day-to-day

business within a market environment that fosters price inelasticity. At this phase firms will normally indulge in product differentiation and market positioning as a means to distance themselves from existing market competitors and to identify a market niche that they can service with their core products or services.

Firms will eventually encounter market-based obstacles that are known as tipping points, which either result in the ultimate success or failure of firms. The first challenge firms will encounter in the early market is the referred to as the “Bowling Alley”, which will compel firms to shift their focus away from a purely technology-based approach(es) towards a greater emphasis on customer demands [1]. For instance, firms can implement bowling alley strategies frequently in relation to cybersecurity sensitive products within the banking sector. Within this scenario firms will normally seek out a banking institution and sell their products and/or services to them, then firms may use this point of contact to engage with the banking institution’s customers to initiate more marketing.

As firms continue their progression within the market, the next tipping point occurs when firms transition away from their initial customer base towards another. For example, firms will transition away from their initial technology enthusiast customer base towards a base known as the early majority. This change will also generate greater resistance within firms to incorporate novel technologies into their corporate structures that do not explicitly support their customer demands.

As firms continue to progress within the market and enter a period of very high market growth known as the “Tornado” [1], they will eventually encounter another tipping point, which is known as the platform formation. This tipping point emerges when there is an overabundance of product offerings within the market, which tends to overwhelm customers. To address this predicament firms will often aim to simplify their current market offerings through a standard setting process. Sometimes the platforming is mandated by governmental bodies, such as the case with the 2024 European Parliament law making universal serial bus USB Type -C charging connections standard for all electronic devices covered under the European Union (EU) ISB-C law a requirement to be sold in the European Union [4]; other times, the market reaches the common platforms through competition as in the video home system (VHS) versus Betamax case.

Either way, standardizing platforms will enable firms to simplify market behaviours by enforcing a greater adherence to established standards amongst application providers, and the implementation of effective risk-mitigation strategy(s) against potentially disruptive on-going market variables. These standard platforms will further simplify a firm’s supplier ecosystems once they have exited from high market growth periods, into a virtually linear supply chain formation referred to as clusters [5]. These clusters are a more linear form of platforms with nonlinearity occurring at the supplier and distribution channel ends. As the market further evolves

for firms, cost-based competition will intensify within the market due to increasing presence of ultra-cost-conscious late majority customers and the emergence of true value chain systems. Once clusters have cemented their presence within the market, firms will have to contend with reduced market growth and an oversaturated market space.

The next, and perhaps most important tipping point, Market Shake Out, is generally regarded as an unforgiving task master that eliminates most of the weakest firms within the market and compels the surviving firms to grow through organic cost leadership strategies or through mergers and acquisitions (M&A) [2]. This situation for firms signals their entry into the mature market, or the “Mainstreet” phase, which can linger for a prolonged period of time and may persist until firms experience their ultimate market decline.

Generally, firms that can successfully respond to this increased resistance to price elasticity can expect to experience a period of high market growth. These successful responses will most likely be based on the implementation of tailored strategies that focus on cultivating customer relations, delivery of refined products and services to market, and the utilization of vertical and horizontal marketing. Firms can maximize their market positions through various strategies that are timely implemented to align with the new market conditions. For instance, firms can expand their market space through strategies that emphasize innovations [6] and then undergo a round of M&A to strengthen their market position within market maturity [7].

It is essential that the strategies firms implement are able to keep pace with the rate of change within the market. Firms will need to continuously re-evaluate their strategies to align with current circumstances, failure to do so can result in their market exit [8]. Firms will need to realign their current operations to suit the on-going demands of customers, which have changed since the emergence of more mature market phase. Namely, customers within latter market phases will desire complete products and services and be much more price sensitive than their early market counterparts.

2.1. How the High-Technology Lifecycle Impacts Corporate Strategy

The three structures superimposed, the client base, deep structure and surface structure deal with slightly different concepts, the client base is constant in the lifecycle, the deep structure, like earth’s mantle, drifts over the core and can erupt at tipping points and surface structure defines the climate of the market.

Furthermore, a firm’s customer base is central to their market activities and lifecycle trajectory, which could either foster market circumstances that promote predictability or instability within the market. For instance, early market phases tend to harbour nonlinearity that gives rise to complexity and later these nonlinear dynamics flatten into linear shapes of mature market value chains [2, 8]. The non-linearity

occurs when firms use different fabricators for new products or contract with companies on a non-recurring basis [9].

To illustrate this point, firms often utilize product positioning within early markets to identify their optimal market space in the market. However, in mature market phases firms are usually tied to their market position which makes the maximization of productivity and cost effectiveness the most viable strategy. Please see Figure 2 for further information about the available strategies firms can pursue during the market lifecycle.

Firms within early market phases will generally make

strategic choices that focus on product innovation effectiveness, which will eventually shift towards maximizing cost efficiency in mature market phases. This latter cost focused strategy is known as cost leadership, which is aligned to strengthening a firm's competitive advantage in mature market spaces. Within mature markets firms can implement M&A activities or market share expansion to aid their cost effectiveness strategy. Firms that cannot cope with shifting market circumstances will often escape into niche market spaces and may occasionally, as Apple did, re-emerge later as a dominant market player [10].

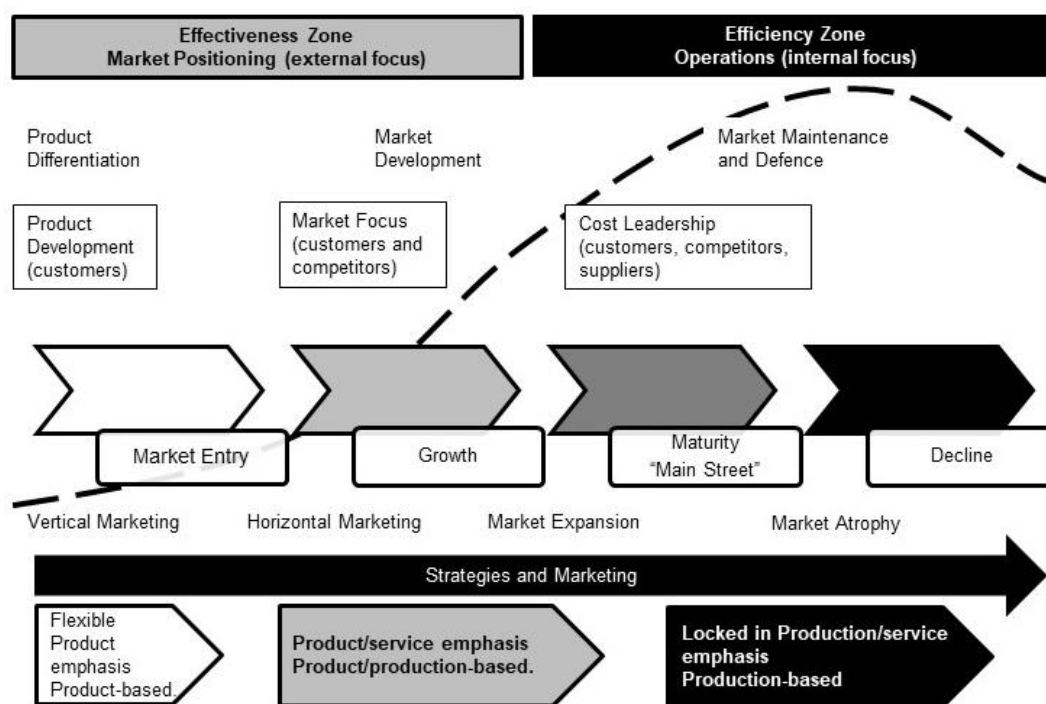


Figure 2. Zones and Strategies and Marketing Behaviour Along the Lifecycle.

In addition, once firms have entered the middle period of their lifecycle trajectory, they will encounter a transition zone between Effectiveness and Efficiency zones, which is referred to as a period of standard setting. Within this standard setting phase, also known as the platform, firms congregate to preserve their market position within the market by forming long-term firm alliances, which can generally dictate market standards across the industry. This scenario is driven by effectiveness but this phase will gradually transform a firm's internal structures to become more focused on channels, which tend to align with the objectives imposed upon firms within the Efficiency zone.

2.2. The Weight of Financial Pressures

As firms progress through the lifecycle their financial objectives and indicators will likewise change. At the beginning of the lifecycle within early market phases, firms will be

concerned about their top line using either revenues or gross sales to define their corporate successes or failures. As firms enter mature market phases, they will increasingly prioritize their profit margins and return on investment (ROI). In the effectiveness zone firm value relates to top line or revenue growth and in the efficiency zone to various profit measures and cash flow criteria.

Within early markets firms will often stack their project portfolios to identify new customer bases and to achieve their top line objectives. When new customer bases are identified firms will usually align themselves to them, which will require a relatively high degree of adaptability within the market to accomplish. Once firms enter mature market phase their tactics will likewise change to the suit new, on-going, market circumstances. For example, once firms cross the chasm, which is a term that refers to a firm's general transition away from their early adopter customers towards a broader customer base, will emphasise the launch of their finalized

products into the market, the identification of specific client profiles, and the utilization of vertical marketing activities to maximize their profitability.

Also, firms can use various tools to gauge their financial performance against market norms. For instance, firms can use Return on Equity (ROE), Return on Investment (ROI), or Return on Assets (ROA) to evaluate themselves against relevant firms operating within the market. Overall, these figures will be used as a ratio of a/b to determine the results, or the expected results of the investment. Firms can also use Market Value Added (MVA) and Economic Value Added (EVA) within early market phases and mature markets to gauge their financial performance. Generally, MVA will depend on a firm's top line growth and EVA will be based on various measures of a firm's Return on Experience (ROX). Please see Figure 4 for further information.

Firms will often utilize concurrent engineering as a means to further reinforce their current strategies within their market space. Concurrent engineering will shift responsibility away from a firm's product developers towards its marketing team, whom usually have the active financial backing and the passive approval of the firm's logistical or production processes, which will vary depending on whether the firm is conducting its own manufacturing or is relying on external suppliers for its assembly needs. When the supply chain is well developed and linear the firm becomes an assembler and manufacturing is done upstream as in auto industry. For instance, the aerospace company, Boeing, utilized concurrent engineering with the development of the 777 airliner as a means to deliver a "clean-sheet" design from project initiation to its conclusion, in just over four years [11]. Boeing's recent safety and ethical problems stem from deciding to hide reliability issues that may cause its serious demise as lead manufacturer of airplanes [12].

2.3. How Projects Change Through the Lifecycle: Effectiveness and Efficiency Projects

Virtually all firms within early market phases, will utilize a top line revenue or volume of sales strategy when executing projects. Within this zone project portfolios will mostly focus on customer base identification and expansion, where many of these projects will be aligned to meet corporate objectives; however, most of these projects will fail to accomplish these objectives. Although, this failure to meet corporate objectives will not pose a major problem for firms if a few key projects are ultimately successful. The success of these key projects will often compensate for the failures of other projects. Likewise, within this zone firms have the additional benefit of being more flexible with market position, and as such, these firms can implement short-term projects and replace them with relatively short notice with different ones. This is life in the Effectiveness zone.

On the other hand, projects executed in the Efficiency zone, which occurs in the late market phase, will operate in a dif-

ferent manner as they are aimed to strengthen customer relations, which is further enhanced with a firm's value chain operations [9]. Often firms will normally utilize superior manufacturing, market share expansion, and sales volumes to enhance their competitive edge within mature market phases. This scenario will compel firms to exercise corporate discipline and a consistent commitment to their chosen market position, which can become difficult when market obstacles occur. When difficulties emerge the primary goal for firms will be to redeploy their excess cash flows into alternative investments before the firm's asset base becomes trapped as a sunk cost, which will make the investment unrecoverable. Please see Figure 4 for further information about the innovation process.

2.4. The Influence of the Lifecycle on What Type of Innovation Is Being Done, and How It Is Being Done

Innovation is a vital component for a firm's future as it represents the design and conceptualization of its future, and firms can generally use acquisition activities as a substitute for innovation focused strategies [13]. Firms can also use the number of patents they hold as a means to measure their innovation output [14].

Overall, a firm's ability to innovate will reside in its communal imagination, which is often utilized to launch cutting-edge technologies [15]. The ultimate aim of innovative focused strategies is to identify the most suitable market position for firm to reside. Firms within the early market will generally seek lucrative market positions through product differentiation. As firms evolve into market maturity, they will increasingly shift their focus away from innovation derived from product development and technology advancements towards the use of marketing activities and concurrent engineering to secure repeatable business and nascent distribution channels.

2.5. The Link Between Innovation Evolution and the Delivery Structures of Accompanying Projects

Furthermore, any market-based activities that are irregular, infrequent, and sensitive to either time, quality controls, or resources are most likely to be implemented by firms via short-term projects. These types of projects, commonly referred to as entrepreneurial projects, are structured to address market volatility as they tend to be relatively risk-tolerant and flexible enough to accommodate to market circumstances and tend to foster *cutting-edge* products or services rather than product/service improvements [16].

Likewise, innovation type projects will become scarce in mature market phases once market growth stagnation occurs. At this phase a firm's project time horizon will become longer and its associated deliverables will likely manifest in a man-

ner that guarantees seamless integration into a firm's production base. These deliverables tend to enhance productivity projects or a firm's supply and distribution channels with efficiency improvements.

However, firms will often assume higher risk(s) when attempting to achieve desired deliverables with short-term projects as they are usually run on an overlapping portfolio basis. If firms can successfully mitigate risk(s) and progress within the market, their risk exposure will normally decrease and the type(s) of implemented project vary depending on various circumstances. Normally, the most suitable project type for mature markets will mimic a firm's internal functional organizational structures, which will range from its marketing, production, product design, and supply networks. Once firms experience stagnating market growth, projects will become more sequential as a firm's portfolio is reduced to a few major undertakings. Firms at this time will likely run on a portfolio basis with several day-to-day business activities grouped under its corporate umbrella. Please refer to Figure 3 for further information about projects and the lifecycle of firms.

As firms continue to progress within the market and their internal management structures and practices become more

rigid, bureaucratic, and slow [8]; they will enter the financial focus phase. Within this phase firms will usually become increasingly risk averse and pursue a project portfolio strategy due to the size of the firm and their usually functional and divisional corporate structure. Generally, the most efficient project type for this phase is the matrix, which enables firms to implement strategies that accomplish significant internal resources sharing. The structural dimension of these projects will often mimic the firm's own internal corporate structural operations, which is illustrated in Figure 3.

A firm's decision-making processes, leadership strategies, and cultural strategies will have a significant impact upon a firm's efficiencies via its internal and external communication modes, and also be heavily influenced by its internal structures and corporate culture [17]. This influence upon a firm's decision-making processes will occur, whether it originates from the top down, bottom up, or combination of both. Additionally, when a firm's operations and implemented project type align, various operations and corporate activities can be conducted in a similar timeline, which will streamline processes. In these types of cases, the structures of projects often make them sufficiently agile enough to deliver their desired outcomes in a timely manner.

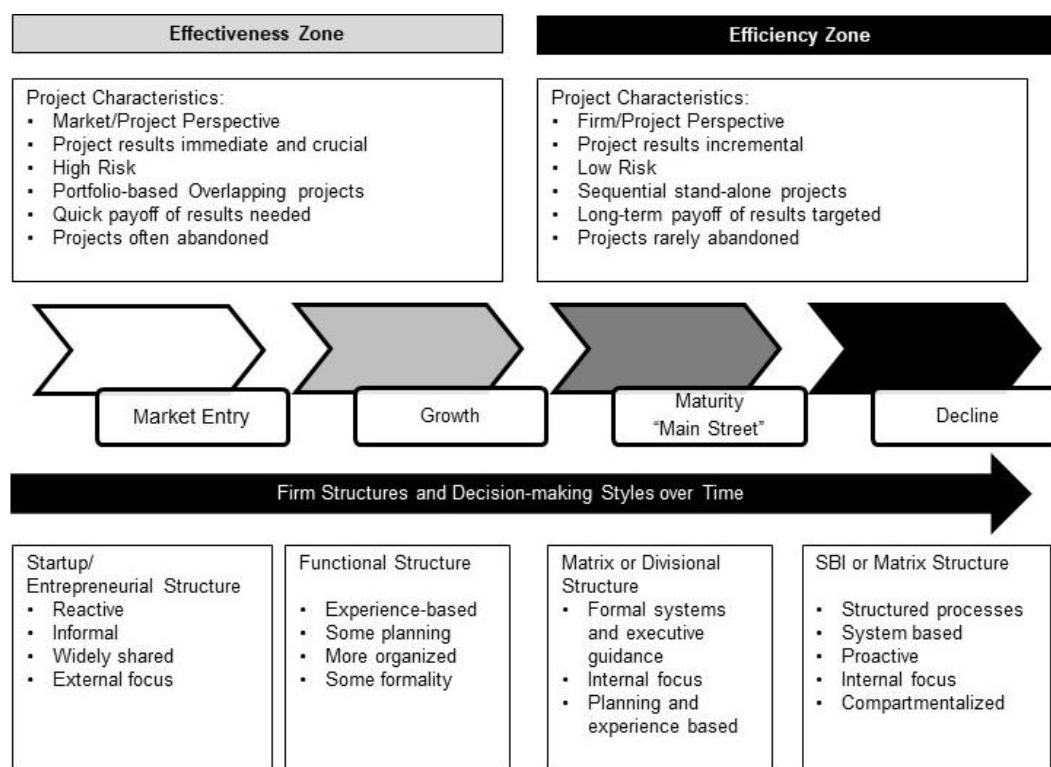


Figure 3. Projects Characteristics and Associated Decision-making through the Lifecycle.

Likewise, the types of ideas disseminated by firms and the market phase they occupy will also influence the degree of flexibility they can exert within the market when attempting to adapt to ever-changing occurrences. Firms will normally navigate the market using inductive thinking in the early

market phases which are, effectively, leaps of faith, and will transit normally to using a deductive, well-defined mode of thinking within late market phases. This shift in a firm's mindset will see them transition away from utilizing spontaneous outburst of innovative thinking within the entrepre-

neurial mode, to the utilization of deliberate circumscribed reasoning within late market phases. Toyota's quality management systems ensure internal improving within their mature market space by empowering its personnel, those that are doing the work at the lowest level of its organization, to employ an incremental improvement approach, which should enable continuous improvement to occur [18].

2.6. The Management Challenges and the Exceptions to the Rule

A firm's ability to identify the type of project that it should implement, given the current market circumstances, will also determine their long-term market viability. For instance, firms entering the market must utilize projects that enable them to quickly establish their market position, while firms within late mature market phases will normally favour long-term projects, which tend to be risk averse. The types of innovation change from transformational to incremental over the lifecycle, and a firm's management personnel can alter which projects are preferred over others. Project managers tend to be more risk tolerant compared to other firm employees, which can become problematic when firms are within late market phases, as such risk taking is strongly discouraged by management

during market maturity. This dissonance can also be seen between a firm's priorities and the project they implement, which can ultimately position strategies for failure and generate unanticipated outcomes.

Occasionally projects can defy these expectations and have the potential to impact a firm's operational activities. Several such projects include Boeing's 747 airliner that started out life as a low unit seller and stop-gap measure until supersonic passenger service was the norm [19], or Trans Canada's Keystone pipelines [20], and Monsanto's genetically modified organism (GMO) food [21]. Likewise, these projects, especially those that are conducted on a large scale and over the long-term, have the tendency to absorb a large portion of a firm's resources, which can make it more difficult for them to use their capital for other market-based activities or projects. This difficulty can be further heightened given the long-lasting impact these unexpected projects can have upon firms. Given these circumstances firms should carefully consider the potential lingering effect(s) associated to projects throughout their decision-making processes rather than simply its initial impact(s), particularly given its wide range of influence and ramifications. Please see Figure 4 for further information about projects and the market lifecycle.

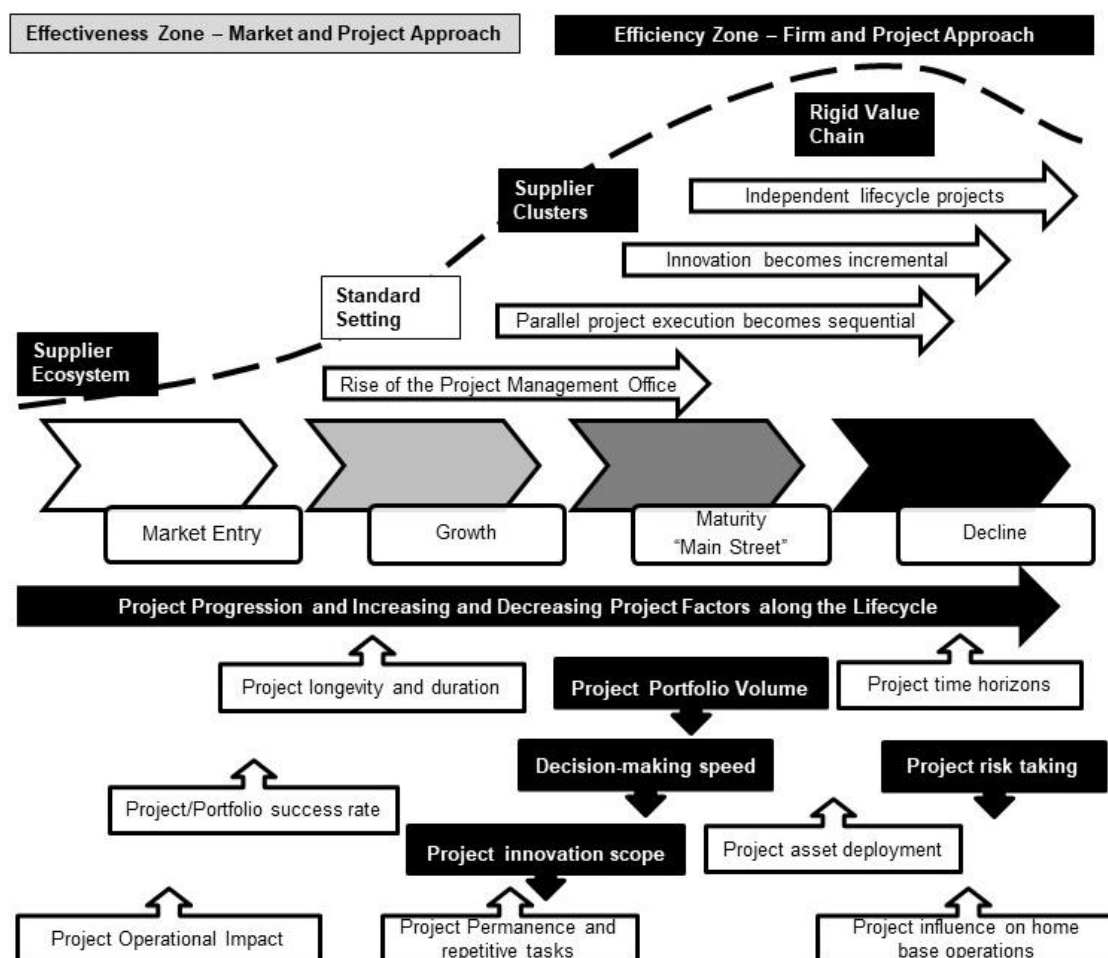


Figure 4. Projects, the Market Lifecycle, and Project Factors.

The Figure 4 also shows how projects can change dramatically in nature as firms progress along the lifecycle with projects getting more formal and assume independence as lifecycle develops. Formalization also means that highly nimble and innovative product creation/delivery transforms to incremental Research and Development (R&D) where the primary consideration will focus on improvements to cost leadership as a means to expand market presence via acquisitions rather than innovation creation. Delivery of projects becomes sequential and parallel execution is abandoned. Mature markets impact the firm's project delivery approaches as projects now have longer cycles and are better structured and are far fewer than at early markets. This means that projects get much bigger and each carries larger penalties for failure. Firms will likewise experience a reduction in their risk tolerance to potential impacts with the sheer volume of projects undertaken. Firms will usually attach greater importance to each project they implement and the cumulative results of these chosen projects will likely drive higher profit margins and more accurate cost accounting. As the firm advances in the lifecycle, the Project Management Office (PMO) rises within the firm to attempt to give discipline to project delivery. Project portfolios contain less projects and are under executive attention as the opportunities or threat as of Mergers & Acquisitions increases.

3. Conclusions

Various scholarly studies and scholars have highlighted some of the important aspects of the relationship between innovation and competition occurring within the market. This article has further illustrated the close and interconnected relationships between innovation projects, the implemented strategies of firms, and the customer base profiles firms possess through the lifecycle.

Early market means finding where the firm fits into the ecosystem and points to development directions and customer decisions to determine which firms will cross the chasm to rapid growth and which will drop away. Early adopters drive the technology development and aid the firm in product development. Firms move from technology-based development to customer-based solutions or applications once the "Bowling Alley" [1] occurs where the products are more in-tune with what the customers want. The early majority target market segment starts being engaged as the firm keeps focused on innovation, but where the products are more in-tune with what the customers want. As growth levels out to early maturity, the market becomes simpler, but the firm becomes more complex, creating evolving challenges to the firm to be able to take advantage of the more conservative but larger late majority customer segment that are looking for complete products. The last customer segment, the laggards, nicely fit into the market where the mass-market product has become a commodity in an increasingly "perfectly competitive market"

where price rules project success and potential profit.

Each of these market eras need the firm to act differently in how they structure their projects and portfolios to have success. The lifecycle depicts the correlations and put forth a logic that both defines the innovation focus along the cycle and the corresponding project delivery structures that is employed to generate the type of innovation. The lifecycle storyline doesn't really change over time and the approaches we have described may have minor details that differ, but overall, it stays the same. Enhancing the current discourse surrounding the relationship between businesses and the processes associated with projects is vital as these relations help inform and improve strategies aimed at maximizing a firm's market competitive advantage throughout the market lifecycle.

Abbreviations

EU	European Union
M&A	Mergers and Acquisitions
VHS	Video Home System
ROI	Return on Investment
ROE	Return on Equity
ROI	Return on Investment
ROA	Return on Assets
MVA	Market Value Added
EVA	Economic Value Added
ROX	Return on Experience
GMO	Genetically Modified Organism
R&D	Research and Development
PMO	Project Management Office

Author Contributions

Larissa Koplyay: Writing – review & editing

Tamas Michel Koplyay: Conceptualization, Resources, Writing – Original draft

Brian Mitchell: Validation, Visualization and Writing - review & editing

Conflicts of Interest

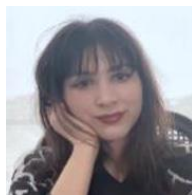
The authors declare no conflicts of interest.

References

- [1] Moore, G. A. (1991). *Crossing the Chasm*. Harper Business Essentials.
- [2] Koplyay, T., & Mitchell, B. (2014b). *Evolution of complexity in high technology markets and its consequences*. Proceedings of Institute of Industrial Engineers (IIE) Annual Conference, Montreal, QC, 891-900.

- [3] Porter M., (1980). *Competitive Strategy*. Free Press, New York.
- [4] News European Parliament. (2022). *Long-awaited common charger for mobile devices will be a reality in 2024*. Retrieved May 19, 2024 from: <https://www.europarl.europa.eu/news/en/press-room/20220930IPR41928/long-awaited-common-charger-for-mobile-devices-will-be-a-reality-in-2024>
- [5] Jazouli, A., Koplyay, T., Mitchell, B., & Motaghi, H. (2017a) The Rise of Complexity Due to Stakeholders Structure Along the Lifecycle in Project Management Organizations. *American Society for Engineering Management (ASEM)*, 18-21, Huntsville, Alabama, USA.
- [6] McFadzean, E., O'Loughlin, A., & Shaw, E. (2005). Corporate entrepreneurship and innovation part 1: the missing link. *European Journal of Innovation Management*, 8(3), 350-372. <https://doi.org/10.1108/14601060510610207>
- [7] Hurta, H., Jazouli, A., Koplyay T., Motaghi, H. (2017). MERGERS AND ACQUISITIONS FROM THE PERSPECTIVE OF PROJECT MANAGEMENT. *Polish Journal of Management Studies*, 15(2), 100-114. <https://doi.org/10.17512/pjms.2017.15.2.10>
- [8] Koplyay, T., & Mitchell, B. (2014a). *The Evolution of Complexity Within Firms*. Institute of Industrial Engineers, Proceedings of IEE Conference, Montreal, QC, June 1- 4.
- [9] Koplyay, T., Cohen, S., & Mitchell, B. (2015). *Evolution of the firm and its alliance structural forms in dynamic markets*. In S. Cetinkaya and J. K. Ryan, (Eds), Proceedings of the 2015 Industrial and Systems Engineering (IISE) Research Conference.
- [10] Dong, H., Zhang, J., & Han, Y. (2023). The Successful Marketing Strategy of Apple. *Advances in Economics, Management and Political Sciences*, 40, 104-109. <https://doi.org/10.54254/2754-1169/40/20232003>
- [11] Sharma, J. K. & Bowonder, B. (2004). The making of Boeing 777: a case study in concurrent engineering. *International Journal of Manufacturing Technology and Management (IJMTM)*, 6. (3/4), 254-264. <https://doi.org/10.1504/IJMTM.2004.005389>
- [12] Benabbad Touirs, B. (2023). Boeing Co: Ethical Failures and Business Scandals. *Journal of Global Awareness*, 4(2), 1-11. <https://doi.org/10.24073/jga/4/02/09>
- [13] Hitt, M. A., Hoskisson, R. E., & Ireland, R. D. (1990). Mergers and Acquisitions and Managerial Commitment to Innovation in M-Form Firms. *Strategic Management Journal*, 11, 29-47. <https://www.jstor.org/stable/2486668>
- [14] Acs, Z. J., & Audretsch, D. B. (1988). Innovation in large and small firms: an empirical analysis. *The American economic review*, 363-367.
- [15] Gunday, G., Ulusoy, G., Kilic, K., & Alpkan, L. (2011). Effects of innovation types on firm performance. *International Journal of Production Economics*, 133(2), 662-676. <https://doi.org/10.1016/j.ijpe.2011.05.014>
- [16] de Brentani, U. (2003). Innovative versus incremental new business services: Different keys for achieving success. *The Journal of Product Innovation Management*, 18(3), 169-187. <https://doi.org/10.1111/1540-5885.1830169>
- [17] Louis, M. (1983). *Culture: Yes: Organization: No*. Paper Presented at the annual meeting of the Academy of Management, Dallas.
- [18] Zarbo, R. J. (2021). Management Systems to Structure Continuous Quality Improvements. *American Journal of Clinical Pathology*, 157(2), 159-170. <https://doi.org/10.1093/ajcp/aqab109>
- [19] Bowman, M. W. (2014). Boeing 747: A history: delivering the dream. Pen and Sword.
- [20] Brady., H. (2017). 4 Key Impacts of the Keystone XL and Dakota Access Pipelines. National Geography. Retrieved from <http://news.nationalgeographic.com/2017/01/impact-keystone-dakota-access-pipeline-environmentglobal-warming-oil-health/>
- [21] Glover, D. (2010). The corporate shaping of GM crops as a technology for the poor. *The Journal of Peasant Studies*, 37(1), 67-90. <https://doi.org/10.1080/03066150903498754>

Biography



Larissa Koplyay earned a BA Honours from Queen's University, Major in History and Minor in English. She is also an alumni and graduate of the University of Alberta's Master of Arts in Communications and Technology program. She has a passion for marketing, information and communications

technology, and social media with particular interest in technology-enabled ethnography. She has explored the role that social media plays in increasing awareness and promoting advocacy in rural communities in the northern territories in her University of Alberta MACT capstone project. She used ethnographic research and advanced analytics to provide new insights to data in social media posts by finding patterns to identify threats in the ecosystem and analyze trends through sentiment analysis and SybilRank algorithms. Larissa currently works as Manager in Residence at the Canadian Advanced Technology Alliance. She has significant experience working in the hi-tech industry in strategic planning and marketing.



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Brian Mitchell has a Ph.D. in Management from Szent István University (now MATE) in Gödöllő, Pest County, Hungary. His research interests include innovation and forms of work organization and high-tech lifecycle. His Masters degree is from Université de Quebec en Outaouais where he

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Research Field

Larissa Koplyay: Social Media Platforms, Hi-Tech Markets, Digital Technology, Learning Models, Organizational Behavior.

Tamas Michel Koplyay: Hitech Management, Innovation, Corporate and Product Lifecycle, Project Management.

Brian Mitchell: Organizational Learning, Forms of Work Organization, Organizational Design, High-Technology Lifecycle, Innovation, Project Management.