

CAPABILITIES-DRIVEN INNOVATION MANAGEMENT™:

CONCEPTUAL FRAMEWORK TO MANAGE THE INNOVATION ECOSYSTEM

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ABSTRACT

Almost all CEOs and executive managers agree that innovation should be a top strategic priority within their organizations. But, a large percentage of corporations are still unsuccessful with the implementation of innovation management within their organizations for various reasons: many are still in the infancy stage of their implementation effort; underestimated the complexity and scope; or there exist a knowledge gap.

Current industry research and literature build a strong case that disruptive or breakthrough innovation has become an absolute requirement for sustainable growth and survival. To support this theory, the management of innovation as an additional corporate business capability must increasingly become more important as a critical factor for corporate success.

This paper revisited competitive advantage, core competency, capabilities and innovation process model theories from academic literature, and intersected the knowledge with empirical data collected as the current state of innovation management within corporations at a global scale.

The research identified ten innovation management capabilities with strong interdependencies and critical relationships to support innovation successfully within corporations.

The Capabilities-Driven Innovation Management™ conceptual framework was then developed with the goal to introduce a flexible map, consisting of strongly interrelated capabilities to simplify the understanding and implementation of innovation management capabilities and the management of a corporate innovation system and ecosystem.

The expected end result of this framework is to increase successful innovations, competitive advantage, growth and the generation of wealth for employees, shareholders and all other stakeholders.

Key words: innovation, management, capabilities, framework, implementation

INTRODUCTION

Corporate stakeholders demand that executives must generate wealth through growth in market share, revenue and profit margins to realize larger dividends, increased market capitalization and total shareholder return (Christensen and Bever, 2014).

The past few decades, strategies to generate competitive advantage and growth shifted dramatically from obsolete levers such as productivity management to enable cost and price reduction, quality management to ensure product reliability or even global corporate mergers and acquisitions to gain size and economies of scale to innovation and the continuous development of new capabilities to

ensure a steady stream of new innovative products (Almquist et al., 2013, Porter, 1979, Prahalad and Hamel, 1990, Shelton and Percival, 2013) in very turbulent, dynamic and competitive global markets (de Jong et al., 2013, Hubbard et al., 2014, Kinni, 2014, Verma et al., 2011, Xu et al., 2007).

Silverstein et al. (2007) summarized this concept extremely well (Figure 1), demonstrating how innovation became a structured system as an organizational capability.

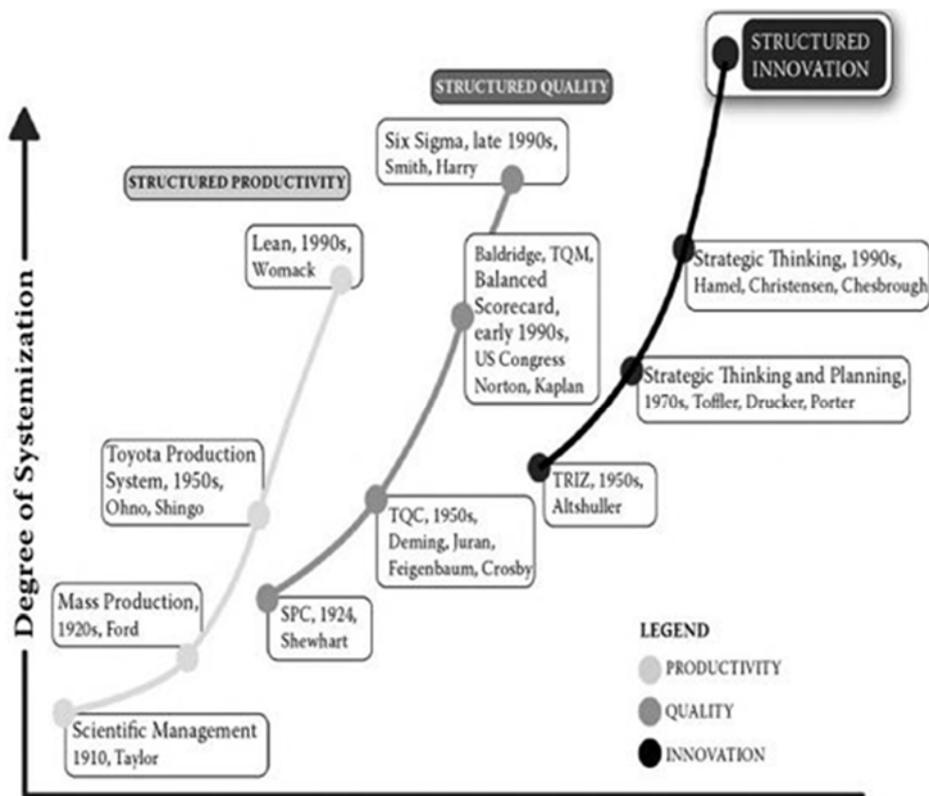


Figure 1: In the big picture of organizational capability, structured innovation is the next frontier for development and systemization (Silverstein et al., 2007 : 16)

This means, the capability to manage a well-structured innovation system is considered to be the solution to create competitive advantages with valuable solutions (for customers and consumers) in such a predictable way, that the company will generate brand recognition (and profit margins) in the market and wealth for employees, shareholders and stakeholders through consistent (market and revenue) growth (Almquist et al., 2013, Miller et al., 2012, Shelton and Percival, 2013). To summarize, Figure 2 demonstrates the conceptual chain of drivers for innovation.

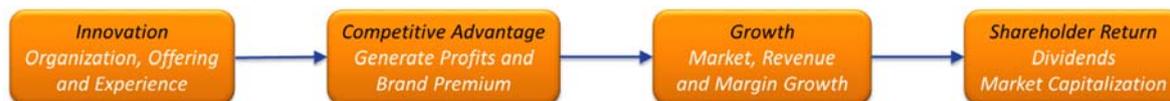


Figure 2: Conceptual chain of motivational drivers for innovation.

In 2013 at least 70% to 90%, depending on the selected survey's target population bias toward innovation, of executive managers agreed that innovation is one of their top three strategic critical factors for success (Almquist et al., 2013, Koetzier and Alon, 2013, Shelton and Percival, 2013, Taylor and Wagner, 2014, Wagner et al., 2013).

From financial analytics for the past decade, it was demonstrated that companies with small research and development budgets can also be very innovative (Jaruzelski et al., 2014). This concluded that increased budgets for research and development do not necessarily increase innovativeness, a direct correlation does not exist.

With the evolution of innovation process models (Eveleens, 2010) the 5th generation (Rothwell, 1994) became a complex system (Hajikarimi et al., 2012, Hobday, 2005, Koetzier and Alon, 2013, Taylor et al., 2012, Taylor and Wagner, 2014, Xu et al., 2007). The capability to manage a complex innovation system is then another very important factor that will determinate a corporation's financial future (Drucker, 1985, Jaruzelski et al., 2014, Koetzier and Alon, 2013, Wagner et al., 2013).

It was then very surprising that only 20% to 30%, statistics collected from individual unrelated surveys, of executive managers made the serious commitment to support a formal innovation system or engine with the implementation of an institutionalized innovation management corporate capability (Almquist et al., 2013, Snowden et al., 2014, Wagner et al., 2014). These percentages correlate well with the "Fit for GrowthSM Index" research study, developed by PwC Strategy&, that determined only 17% of corporations are actually ready and able to grow consistently to provide favourable Total Shareholder Return (TSR) (Divakaran and Couto, 2013).

The identified problem then is that at least 50% to 60% of corporations are still very unsuccessful with the implementation of innovation management within their organizations for various possible reasons: many are still in the infancy stage of their implementation effort; they underestimated the complexity and scope; or there exists a knowledge gap.

Therefore, this research's primary aim was to develop a theory that can guide corporations with the management of innovation and increase the level of success with innovation output, competitive advantage, growth and the generation of wealth for employees, shareholders and all other stakeholders.

The research methodology applied to acquire new knowledge started with "dumpster diving" empirical data collection, followed by data mining and analysis to construct "empirical theories" and finally the construction of a full theoretical "academic construct", as suggested by Professor Clayton Christensen at Harvard university (Kirby, 2014) and Emeritus Professor Jean-Philippe Deschamps at IMD and author of the newly released book "Innovation Governance" (Deschamps and Nelson, 2014). This means, apply curiosity to observe, question and listen to what is happening in the industry first, then make associations and connections to determine what problems exist and how to solve them (Dyer et al., 2009, Furr and Dyer, 2014).

For empirical data collection a decision was made to study the latest empirical research reports on the current state of innovation management within corporations from leading global consulting firms such as PwC, Accenture, Boston Consulting Group, etc., as the most productive strategy. This enabled the research to obtain a large volume of empirical data collected from thousands of interviews and surveys over the past decade.

During the data mining and analysis phase, the concept of capabilities (Jaruzelski and Dehoff, 2010, Wagner et al., 2013) always surfaced. Therefore, this research revisited the academic foundations of core competency theory (Prahalad and Hamel, 1990), capabilities theory (Almquist et al., 2013, Christensen and Overdorf, 2000, Hubbard et al., 2014, Stalk et al., 1992), dynamic capabilities theory (Teece and Pisano, 1994, Teece et al., 1997), coherency theory (Leinwand and Mainardi, 2010) and

Total Innovation Management (TIM) theory (Xu et al., 2002). The results delivered various empirical theories for innovation and innovation management.

With the development of empirical theories, ten innovation management capabilities, applied by top innovative corporations, were identified. This resulted in the construction of the Capabilities-Driven Innovation Management™ conceptual framework, the full theoretical academic construct, with the goal to introduce a flexible map of strongly interrelated capabilities to simplify the management of corporate innovation systems and ecosystems.

METHODOLOGY

Overview

The goal with the empirical data collection was to understand how innovation systems and ecosystems are being managed within corporations at a global scale, which this paper considers to be the “current state of innovation management” within corporations. Since this was such an ambitious research project, it would have been impossible for the author to collect the required empirical data himself. Therefore, the author searched for empirical data from existing industry research reports.

Selection Criteria for Empirical Data Reports

The following selection criteria were used as a basis to qualify empirical research reports for this research paper:

- i. The research report had to investigate the current state of innovation management within corporations to determine what activities or principles are being applied to manage innovation by the most successful corporations.
- ii. It was critical that the selected research report collected empirical data at a global scale with a substantial large data samples, ideally with 500 or more respondents. See Table 1 for report details.
- iii. The report had to be from a globally reputable consulting firm or academic institution, known for their knowledge or expertise in business management and innovation management.

Table 1: Empirical research report data sample sizes and geographic coverage.

Report	Sample Size	Demographics	Geographic
PwC Strategy&: Global Top 1000 Most Innovative Companies (Jaruzelski et al., 2014)	±500	Senior Managers	Global
BCG: Global Top 50 Most Innovative Companies (Wagner et al., 2014)	+1,500	Senior Executives	Global
PwC: 17th Annual Global CEO Survey (Snowden et al., 2014)	1,344	CEOs	Global
PwC: Global Innovation Survey (Shelton and Percival, 2013)	1,757	C-suite Executives	Global
Accenture: Why Low Risk Innovation is Costly (Koetzier and Alon, 2013)	519	Executives with +\$100m Rev	US, UK & FR
Accenture: How To Get The Most From Your Best Ideas (Alon and Chow, 2008)	601	Executives with +\$750m Rev	US & Europe

Report	Sample Size	Demographics	Geographic
Capgemini Consulting & IESE Business School: Innovation Leadership (Miller et al., 2012)	260	Innovation Executives	Global
Imaginatik: State of Global Innovation Survey (Anonymous, 2013)	204	Innovation Managers	Global
GE: Global Innovation Barometer Survey (Anonymous, 2014)	3,200	Executives Interviews	Global
Planview: 4th Product Portfolio Management Benchmark Study (Carlson, 2013)	514	Innovation Managers	Global

Detail of Selected Reports

The following industry research reports were collected for empirical data collection, data mining and empirical theory development:

- i. **PwC Strategy&: Global Top 1000 Most Innovative Companies** (Jaruzelski et al., 2014):
 - a. **Sample:** "PwC Strategy& (formally known as Booz & Company) identified the global 1,000 private corporations that spent the most on R&D since 2005."
 - b. **Methodology:** "For each of the top 1,000 companies, we obtained from Bloomberg and Capital IQ the key financial metrics for 2008 through 2013, including sales, gross profit, operating profit, net profit, historical R&D expenditures, and market capitalization. To enable meaningful comparisons across industries, the R&D spending levels and financial performance metrics of each company were indexed against the average values in its own industry. In addition, for the past four years we have asked the Global Innovation 1000 survey respondents to name the companies they thought were the world's most innovative. Over the past few years, we have carefully analysed the innovation factors that enable some companies to consistently achieve superior financial results. A great deal of the work we have done in the annual Global Innovation 1000 studies over the past several years has involved teasing out the different ways companies approach innovation, and the implications of those approaches."
 - c. **Previous annual reports included:**
 - i. Proven Paths to Innovation Success (Jaruzelski et al., 2014)
 - ii. Navigating the Digital Future (Jaruzelski et al., 2013)
 - iii. Making Ideas Work (Jaruzelski et al., 2012)
 - iv. Why Culture is Key (Jaruzelski et al., 2011)
 - v. How the Top Innovators Keep Winning (Jaruzelski and Dehoff, 2010)
 - vi. Beyond Borders (Jaruzelski and Dehoff, 2008)
 - vii. The Customer Connection (Jaruzelski and dehoff, 2007)
- ii. **BCG: Global Top 50 Most Innovative Companies** (Wagner et al., 2014)
 - a. **Sample:** "Data is collected from more than 1,500 senior executives each year since 2005."
 - b. **Methodology:** "These executives then rank the global top 50 innovative companies, which also gets weighted to incorporate relative three-year shareholder returns, revenue growth, and margin growth."

- c. **Previous annual reports included:**
 - i. Breaking Through is Hard to Do (Wagner et al., 2014)
 - ii. Lessons from Leaders (Wagner et al., 2013)
 - iii. The State of the Art in Leading Industries (Taylor et al., 2012)
 - iv. Companies on the Move (Verma et al., 2011)
 - v. A Return to Prominence (Andrew et al., 2010)
- iii. **PwC: 17th Annual Global CEO Survey** (Snowden et al., 2014)
 - a. **Sample:** “We’ve conducted 1,344 quantitative interviews with CEOs in 68 countries worldwide, selecting our sample based on the percentage of the total GDP of countries included in the survey, to ensure CEOs’ views are fairly represented across all major countries and regions of the world.”
 - b. **Methodology:** “The lower threshold for inclusion in the top 10 countries (by GDP) was 500 employees or revenues of more than \$50 million. The threshold for inclusion in the next 20 countries was companies with more than 100 employees or revenues of more than \$10 million.”
- iv. **PwC: Global Innovation Survey** (Shelton and Percival, 2013)
 - a. **Sample:** “We drew on insights obtained from interviews with board-level executives with responsibility for overseeing innovation from 1,757 C-suite and executive-level respondents, across more than 25 countries and 30 sectors.”
 - b. **Methodology:** “For the purpose of our analysis, we segmented these companies based on a balanced scorecard calculated from their responses to six areas, which are explored in our study. From this scorecard, we then identified the top 20% innovators (359 companies), and the bottom 20% innovators (395 companies), enabling us to contrast their relative characteristics and experiences and zero in on the strategies and tactics of the most-innovative group.”
- v. **Accenture: Why Low Risk Innovation is Costly** (Koetzier and Alon, 2013)
 - a. **Sample:** “519 executives (vice presidents, directors, managers) at large organizations (revenues in excess of \$100 million or the equivalent) in the USA (254), UK (230), and France (35) answered a 28-question, 15-minute survey administered on-line (November 2012).”
 - b. **Methodology:** “Trend results and comparisons were drawn from a comparable survey conducted by Accenture in 2009 that sampled 639 respondents from the U.S. (330) and U.K. (309).”
- vi. **Accenture: How To Get The Most From Your Best Ideas** (Alon and Chow, 2008)
 - a. **Sample:** “The Economist Intelligence Unit, on behalf of Accenture, surveyed 601 senior executives in late 2007 at major companies in North America and Europe. Respondents included board members, CEOs, CFOs and other C-level executives, as well as senior managers. All of the respondents’ companies have more than US\$750 million in annual revenues, and nearly two-thirds have annual revenues of at least US\$5 billion.”

- x. **Planview: 4th Product Portfolio Management Benchmark Study:** (Carlson, 2013)
- a. **Sample:** “Appleseed Partners and OpenSky Research, commissioned by Planview, conducted the fourth benchmark study on the state of product portfolio management. “A total of 730 people participated in the survey. Out of those, a total of 514 met the criteria for the research, completed the survey, and are represented in the findings provided in this report. Participants had to be involved in their organizations’ product development processes to qualify to participate in the study. This year, 60% of participants were from North America, 25% from Europe, 7% from Asia Pacific and Australia, with the remainder from Latin America, Middle East, and Africa.”
 - b. **Methodology:** “The Product Portfolio Management benchmark research consists of two phases: a qualitative telephone interview that provides in-depth information on some of the main topics, and used to develop the questions for the second phase, the quantitative online survey.”

FINDINGS

Empirical Theory Development

A textual data warehouse was constructed with data collected primarily from 10 empirical research survey reports (see Table 1) that were published by reputable consulting firms regarding the current state of innovation management at a global scale.

With the knowledge of core competency and capabilities theory, empirical research data was collected, curated and analysed with the objective to identify capabilities required for the successful implementation and management of an innovation ecosystem to support the innovation system and its processes within a corporation. Table 2 is a summary of the identified capabilities required for successful innovation management.

Table 2: Summary of innovation management capabilities required for success.

Report	Competitive Intelligence	Intellectual Property (IP)	Strategy Coherency	Big Data Analytics and Systems	Governance	Metrics	Operations and Processes	Leadership, HR and Culture	Networking and Collaboration
PwC Strategy&: Global Top 1000 Most Innovative Companies (Jaruzelski et al., 2014)	X		X					X	
BCG: Global Top 50 Most Innovative Companies (Wagner et al., 2014)	X	X	X				X		
PwC: 17th Annual Global CEO Survey (Snowden et al., 2014)			X				X		X
PwC: Global Innovation Survey (Shelton and Percival, 2013)			X						X
Accenture: Why Low Risk Innovation is Costly (Koetzier and Alon, 2013)			X	X			X		

Report	Competitive Intelligence	Intellectual Property (IP)	Strategy Coherency	Big Data Analytics and Systems	Governance	Metrics	Operations and Processes	Leadership, HR and Culture	Networking and Collaboration
Accenture: How To Get The Most From Your Best Ideas (Alon and Chow, 2008)			X			X	X		
Capgemini Consulting & IESE Business School: Innovation Leadership (Miller et al., 2012)	X		X		X			X	
Imaginatik: State of Global Innovation Survey (Anonymous, 2013)								X	
GE: Global Innovation Barometer Survey (Anonymous, 2014)				X					X
Planview: 4th Product Portfolio Management Benchmark Study (Carlson, 2013)			X	X				X	
Total	3	1	8	3	1	1	4	4	3

During the empirical theory data mining phase, the following foundational early stage trends regarding the future of innovation management were also observed:

- i. The institutionalization of innovation management as a corporate business function.
- ii. Increased awareness of capabilities and systems theory thinking applied to innovation management.

The following list of questions evolved during the discovery and association process (which will be discussed in the following paragraphs):

- i. Why innovate, are there any motivational drivers?
- ii. How must innovation be defined for industry today?
- iii. Why managing innovation, are there any motivation drivers?
- iv. What makes the management of innovation so difficult?
- v. How must innovation management be defined for industry today?

The first task during data mining was to determine why corporations care to innovate, what motivational drivers force corporations to look at innovation as a solution for growth and the generation of wealth. A surprise finding was that drivers for innovation are not only fuelled by external competitive forces, but also by shareholders (dividends and market capitalization), employees (salaries and benefits) and all other stakeholders (environment and social responsibilities) with high expectations for the generation of growth and wealth. Five motivational drivers for innovation were formulated as follows:

- i. Hypercompetitive industries.
 - a. Globalization.
 - b. Barriers of entry are getting smaller and lesser.

- c. Product innovation alone is insufficient.
 - d. Business model innovation is required.
- ii. Turbulent and dynamic markets.
 - a. Fast-moving, uncertain markets with new entrants and solution offerings.
 - b. Increase of disruptive and breakthrough innovations enter the market.
- iii. Fast paced changing world.
 - a. Increased influence by the Internet, social media and digital devices.
 - b. Increased pace to get idea-to-market.
 - c. Shorter product life cycles.
- iv. Demanding shareholders for growth and wealth.
 - a. Market capitalization and dividends requires increased revenues and profits.
- v. Demanding customer and consumers.
 - a. Cheaper and better solutions to help get the job done.
 - b. More individualized products or service solutions.

With the identified motivational drivers for innovation, this research constructed a new definition for innovation as follows:

Innovation is a system that delivers new ideas as unique solutions (for customers and consumers) in such a way, that the company will generate brand recognition in the market and wealth for employees and stakeholders.

Where:

New ideas may require sustainable, disruptive or breakthrough innovation efforts (Christensen and Bever, 2014) to deliver new improved profit models, networks, structures, processes, products, services, channels, brands or customer engagement innovative solution types (Keeley et al., 2013).

With a good understanding why corporations have to be innovative and what an innovation system needs to accomplish, the next research objective was to determine the existence of any corporate forces that will motivate an organization to invest into the development of capabilities to manage the innovation system. The motivational drivers for innovation management were identified as the following:

- i. Increased multifunctional and multidisciplinary participation across the corporation.
- ii. Increased collaboration with a larger network of resources outside the corporation.
- iii. Increased portion of portfolio containing disruptive and breakthrough innovation efforts.

- iv. Increased pace with product research, development and commercialization.
- v. Increased complexity of solutions with high tech integrations and new business models.
- vi. Increased risks for technological and commercial success.
- vii. Increased financial investments required.

Even if a corporation acknowledges the above mentioned motivational drivers for innovation management, the following challenges were identified that can prevent the successful implementation of innovation management as an institutionalized business function:

- i. Corporate commitment and support.
- ii. Complex innovation ecosystem:
 - a. Many internal and external stakeholders.
 - b. Concurrent social collaboration internal and external.
 - c. Many cross-functional and multidisciplinary team members across the organization.
 - d. Organization design, organizational behaviour and culture.
- iii. Extreme difficulty and expense to build new innovation management capabilities.
- iv. Transformation of tacit knowledge (intangible assets) into products (tangible assets).
- v. Alignment of technological knowledge with turbulent and dynamic market insights.
- vi. Integration of product data, technology forecasts, consumer analyses and market insights.

To respond to the motivational drivers and existing challenges for an institutionalized innovation management function, this research constructed the definition of innovation management to be as follows:

Innovation Management should be an institutionalized strategic and holistic management function to automate, optimize and coherently align the multidisciplinary and multi-functional innovation capabilities to ensure good ideas can get through the innovation system fast, effective and efficiently through proper coordination, collaboration and communication across the organization.

Holistically, the **innovation management** function is responsible to make the innovation system:

- i. Repeatable.
- ii. Predictable.
- iii. Consistent.
- iv. Sustainable (imbedded in procedures and values).
- v. Scalable (according to market size).
- vi. Tolerable (less risk).
- vii. Profitable (revenue & growth).

Construction of the Capabilities-Driven Innovation Management™ Conceptual Framework

With the acquired knowledge about the current state of innovation in industry and the important contribution innovation management can deliver, it was finally possible to construct a theoretical solution to increase the success of innovations, competitive advantage, growth and the generation of wealth for employees, shareholders and all other stakeholders.

The research determined that the success of a corporation's innovation system depends heavily on the level of commitment to support a management function that can oversee the operational health and maturity development of the innovation system.

While innovation management can be interpreted at three different levels (Figure 3), this research's scope is at the innovation ecosystem management level positioned at corporate strategy. This management level must oversee the innovation system's environment and maintain a holistic oversight view of the innovation ecosystem. Therefore, this research also focussed on the innovation management capabilities that are not necessarily directly involved with new product innovation activities, but act as supporting enablers for the innovation system. The other identified innovation management levels are at government policy level and at an operational level within the innovation system.

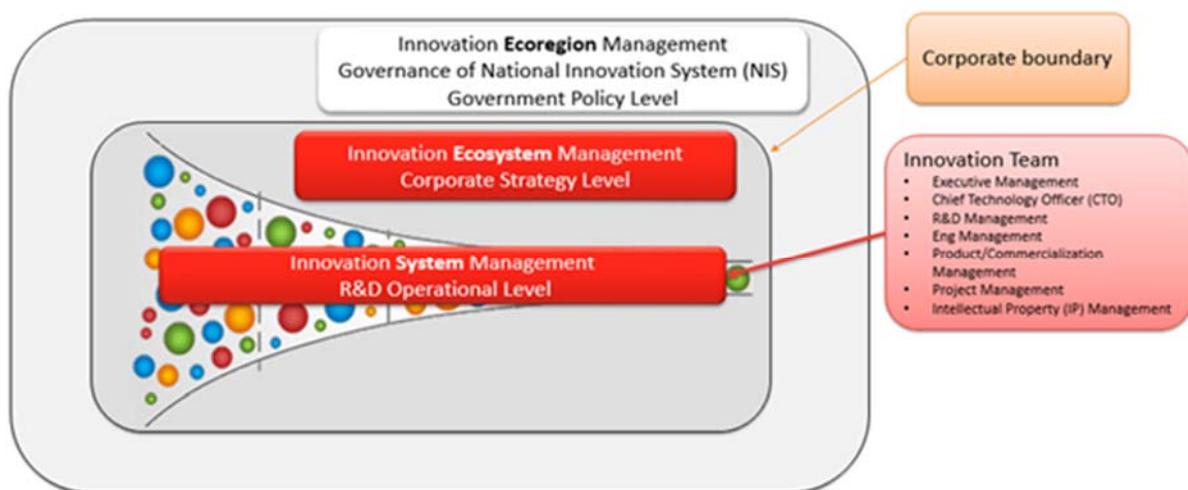


Figure 3: Conceptual Three Levels of Innovation Management

From the distilled empirical data, the following ten innovation management capabilities required for successful innovation management, as a business function within a corporation, were identified:

- i. Competitive Intelligence (CI).
- ii. Intellectual Property (IP) management.
- iii. Strategy, roadmap and portfolio management.
- iv. Information Technology (IT) systems, big data and data analytics.
- v. Innovation management governance.
- vi. Innovation benchmarking.
- vii. Innovation system process operations.

- viii. Innovation commercialization.
- ix. Leadership and culture development.
- x. Collaboration and network development.

The Capabilities-Driven Innovation Management™ conceptual framework was constructed with the goal to introduce a flexible map consisting of a set of strongly interrelated capabilities to simplify the implementation of innovation management capabilities and the management of a corporate innovation system. Figure 4 is a graphical representation of the Capabilities-Driven Innovation Management™ conceptual framework.

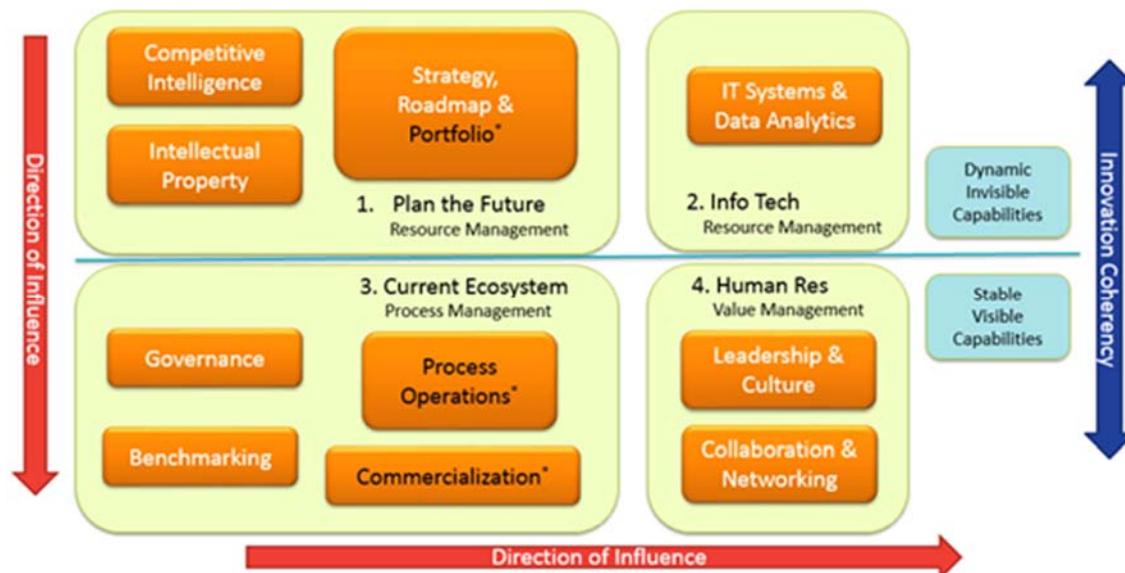


Figure 4: Capabilities-Driven Innovation Management™ framework

The Capabilities-Driven Innovation Management™ conceptual framework has the following attributes:

- i. The framework is only concerned with innovation management capabilities.
- ii. There exist strong interdependencies and critical relationships.
- iii. Influence are from top-to-bottom and from left-to-right.
- iv. Coherency must exist between the top (strategy and planning) and bottom (execution) capabilities.
- v. Capabilities in black are tactical and operational of nature and are currently managed by R&D management who are responsible to drive ideas through the innovation system with capabilities such as product, research, technology and commercialization management.
- vi. Capabilities at the bottom seek to be stable, while capabilities at the top needs to be dynamic and vigilant to steer the company to new opportunities.
- vii. Capabilities at the bottom are more visible in the corporation as processes and values, while capabilities at the top are imbedded in specific resources that are less visible.

CONCLUSIONS

This research identified the motivational drivers that forces corporations to at least acknowledge the importance of innovation and in some cases innovation management as well. New definitions for innovation and innovation management had to be constructed as new empirical theories to support the context of this research. The challenges innovation management will face within a corporation was also identified.

The research acknowledged a new paradigm where innovation is not a simple linear process of single activities anymore, but a very complex fast paced multidisciplinary and multifunctional business system with multiple activities being performed concurrently.

The research concluded that the difference in success with innovation is the level of commitment to support a management function and the development of innovation management capabilities to oversee the health and maturity of the innovation ecosystem and the innovation system itself.

This research delivered a theoretical Capabilities-Driven Innovation Management™ conceptual framework as a flexible map consisting of a set of strongly interrelated capabilities to simplify the management of an innovation system within a corporation as a solution to increase the success of innovations, competitive advantage, growth and the generation of wealth for employees, shareholders and all other stakeholders.

The contribution for industry and academics is a new approach that applies capabilities theory to simplify the institutionalization of innovation management as a business function within corporations.

Future research will investigate:

- i. The acceptance of the Capabilities-Driven Innovation Management™ conceptual framework by academics and industry executives.
- ii. Suggestions on how to improve the Capabilities-Driven Innovation Management™ conceptual framework.
- iii. Strategies to implement the Capabilities-Driven Innovation Management™ conceptual framework within organizations.

Optional future research can:

- i. Determine the value of each innovation management capability within different industries.
- ii. Develop Capabilities-Driven Innovation Management™ maturity metrics.

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