DFMA 2013

28th International Forum on Design for Manufacture and Assembly

Product Development Practices In The Manufacturing Sector: 2010-2020

June 14, 2013

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Product Development Practices In The Manufacturing Sector: 2010-2020

by
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It has now been ten years since Business Week and Boston Consulting Group first ranked the most innovative global companies in 2004. After two decades of augmenting ways of doing business to include the practices of six sigma, lean, agile and flexible, corporations are now augmenting for innovation. There are clear changes in the funding and focus on pre-product development activities, and an increased emphasis on good old-fashioned organic internal innovation in pipeline management. Seemingly the leading companies are also, in addition to and not versus, adding focused infrastructure to acquire and/or transact innovation through external relationships and packaged intellectual property. Organization changes, process changes, and metrics will be addressed for the areas of product management, advanced development, product development, and intellectual property.

This paper is a preliminary summarization of research that is actively in process. It represents a selected sample of approximately seventy companies that have been determined by the GGI research team to be generally representative of overall industry practices. The application of statistical parameters indicating margins of error and other codifying statistics is not appropriate at this time. The reader is encouraged focus on overall findings where there are large differences between data sets, and to focus obvious changes shown by these data from what experienced practitioners would consider to be traditional regular historical practices. A proper statistically-based compilation of the research findings will be performed on the entire population later this year when the research is completed.

The focus of this research is on the Organic R&D-Product Development Operating Environment, Organic Innovation, Open Innovation, Intellectual Property, and CXO Corporate Metrics for these activities. The research is aimed at culling-out industry's current deployment and utilization of selected innovation and intellectual property strategies, processes, practices, techniques, and measures.

This paper addresses, in a preliminary way, the first four of the five research areas. CXO Corporate Metrics, not covered in this paper, has a large population of 101 metrics that are used in industry and a sample size of seventy companies is not sufficient to summarize findings for that research area at this time.

T94 Product Development Practices In The Manufacturing Sector: 2010-2020 – An Essay
ISBN13 978-1-937115-04-3
BOOTHROYD-DEWHURST, INC. 28th International Forum on DFMA
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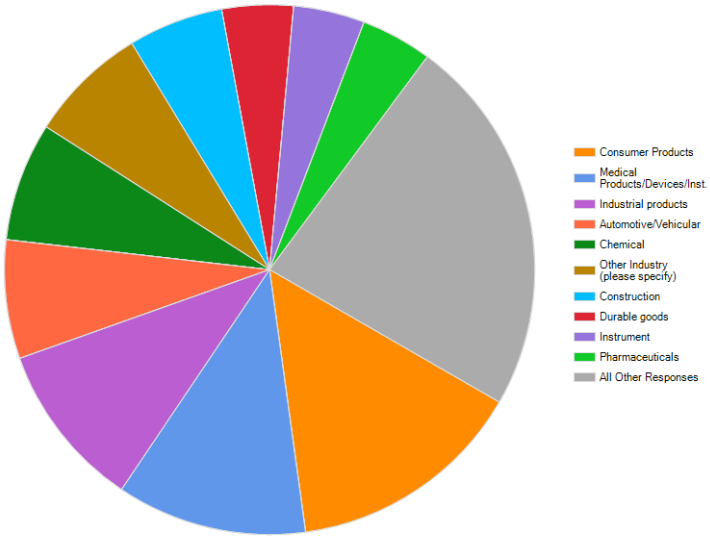
RESPONDENT PROFILE

All companies in this research are identifying, defining, and designing products in North America. Development of the physical product is not necessarily in North America, but the decision making and direction for the product emanates from the North American operations of the global group of companies participating.

The sample of companies is known to be atypical only by the number of private companies included. All other parameters appear reasonable at this time to be consistent with a randomly picked general industry sample.

Numerous industries are represented [Figure A4], and participant companies pretty evenly span all sizes of companies as measured by revenues [Figure A5].

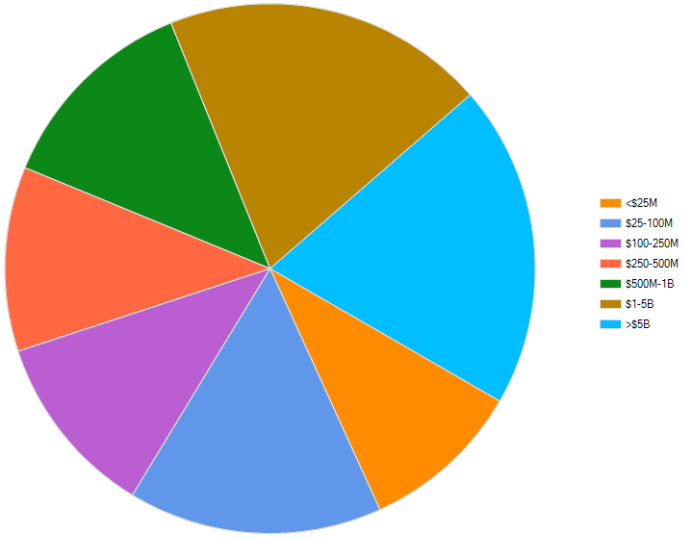
Figure A4
Industries Represented



The products developed by these companies cross the range of manufacturing environments: Continuous Process, Batch Process, Repetitive, Discrete, and Job Shop. The companies generally have global operations. Almost all do some R&D and some manufacturing in North America, Europe, and Asia. About half have operations in Rest Of The World geographies. Almost all sell their products across the industrialized geographies.

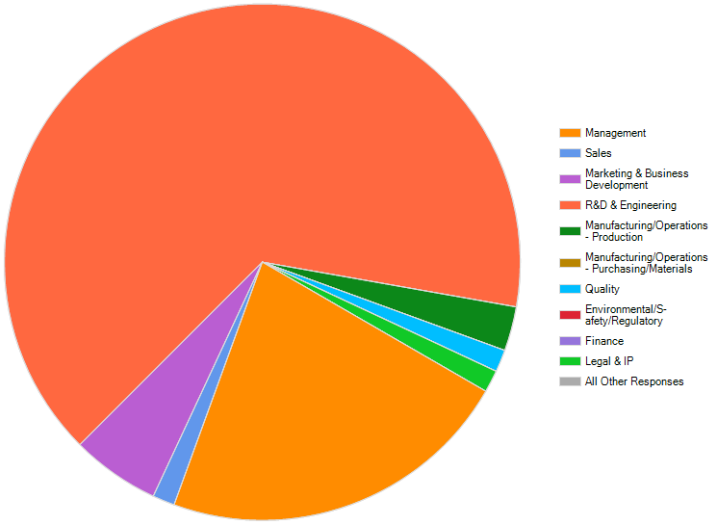
Respondents in this sample are overwhelmingly top managers from Headquarters, Strategic Business Units, and Business Units, and Plants who are involved with generating their company revenues and profits or losses. There are a handful of responses from a cost center only perspective. Because of the focus of this research, the findings are not likely affected.

Figure A5
Size In Revenues Of Participant Companies



Almost all respondents are part of the management team, R&D, or engineering organizations at their companies [Figure A9].

Figure A9
Respondent Job Responsibilities



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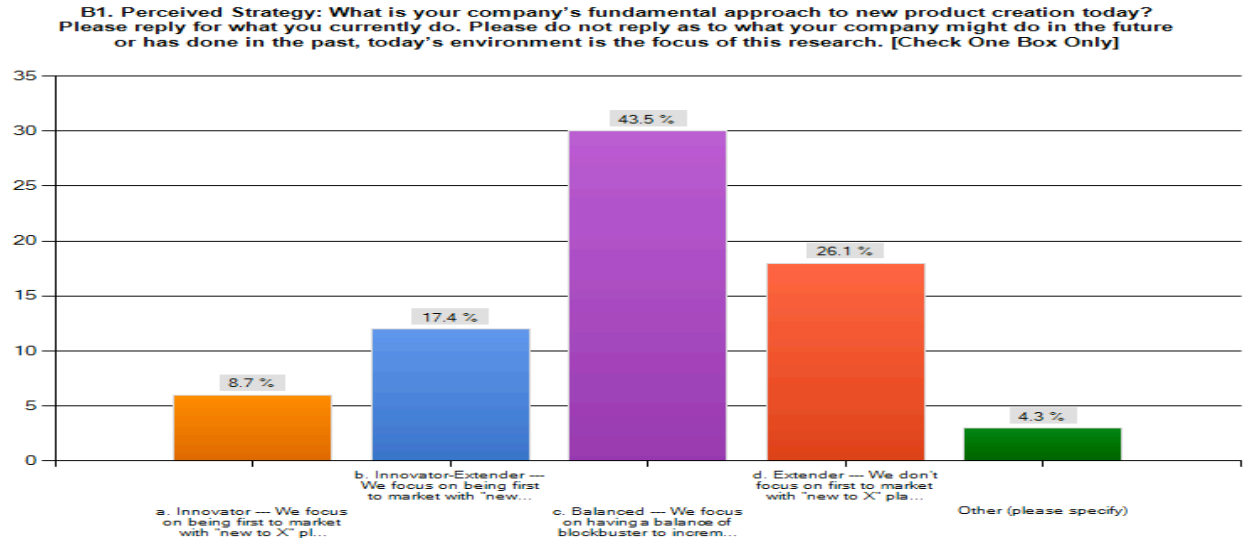
PRELIMINARY RESEARCH FINDINGS

R&D Operating Environment - Strategy

It is often challenging to ascertain exactly what the R&D strategy actually is. R&D executives always do their best to align an overall R&D plan to their company's strategic plan, and to nurture the nascent technologies that will be important to a long term product line. But, in the near and intermediate term, there are zillions of requests to do this and that project and many get approved. There is typically a lot of noise when one takes a snapshot of the working portfolio of products in the pipeline . Sales organizations are notorious for muxing-up a longer term development plan with very short term needs.

That said, rising above the noise level, there are about four major strategies that a company pursues. First is an "Innovator" strategy. It is the most risky of strategies because the majority of development money is spent on things that will be "new to." Failure rates are high, but the rewards can be great if you hit it just right. Just about every company wishes to innovate, but few companies actually pursue an innovator strategy. We researched the subject of R&D strategy in 2008 and now again five years later. In 2008, only 5% of companies classified themselves as following an innovator strategy. Our current research is indicating this number has increased some 60% to be 8+% of companies now following an innovator strategy. With all the talk of innovation for the past ten years, coupled with stronger global competitors and more total competition, it seems that a number of companies in North America have moved to a more risky strategy [Figure B1].

Figure B1
Perceived R&D Strategy



Two other findings appear to jump out from our chosen sample, but we wish to finish the research before making a final call. In 2008, almost 41% of companies deemed themselves to be following

a "platform-derivative" strategy, also called an "innovator-extender" strategy. These companies create some type of "new to" product and then continue to "build it out over time." The disadvantage of this strategy is that initial platforms seldom have a great ROI but the derivatives and tailoring are a cash cow. A good deal of system engineering is required to create a flexible platform that will meet many revenue producing needs. Our current research indicates that there has been more than a 50% decrease in the companies that pursue this strategy with the decrease going almost evenly split to pursue a "balanced portfolio" or an "extender" strategy. Five years ago, 36% of companies were balanced and they are now 43%. Extender was 17% and it is now 26%. Perhaps the investment community's new mantra that companies need to show consistent returns from new products every year is causing a movement to shorter duration efforts to avoid the often down years when new platforms are released. Analogously, companies that struggle to innovate successful new platforms may be becoming more conservative and are waiting until their more successful competitors have shown their hand and then following/extending new market offerings with a better value equation.

If these collective changes in strategy turn out to be accurate when the research is completed, it likely signals a shift or maturation of the innovation buzz of the past decade. Some companies have determined they can be successful innovators. Other companies have lost their moxie and are heading back to preinnovation-era development strategies.

R&D Operating Environment - Organic Innovation

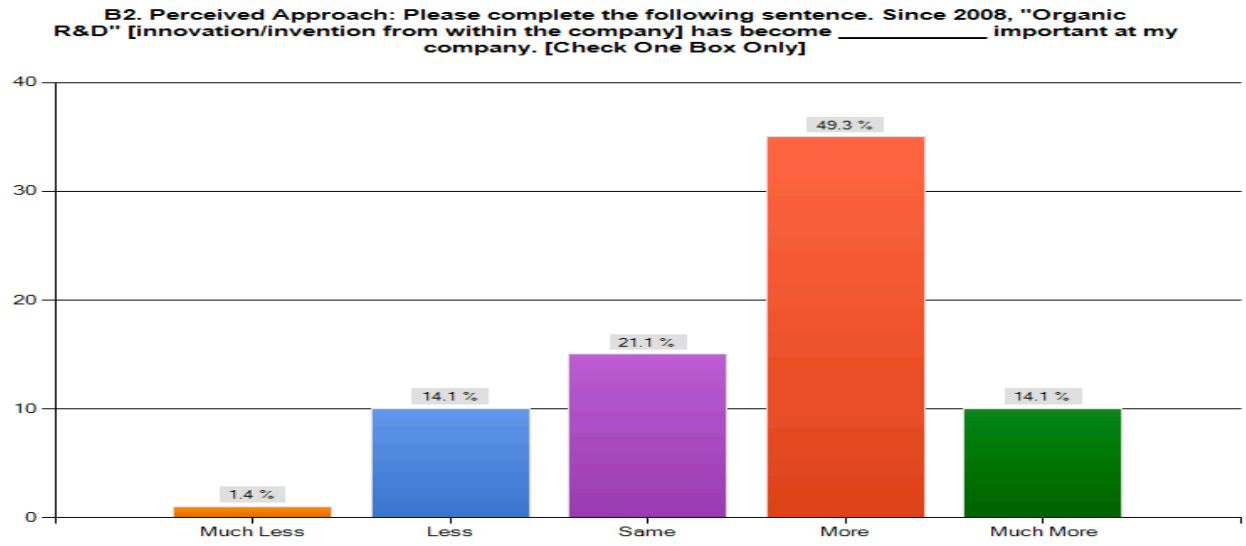
Organic Innovation is the ability of a company to invent from within. Open Innovation is the ability of a company to identify capabilities that exist outside the company that can create value within or for the company. There has been a good deal of buzz about being open since the first books were penned in the early 2000s. While Proctor & Gamble has had success with being open, many that have tried it have not fared so well. To boot, and it is really hard to put facts and data to this statement, Wall Street analysts seem to appreciate the ability to invent from within greater than they appreciate the ability to acquire innovation externally. It makes sense, it is just hard to assemble quantitative information to affirm the observation.

In comparison to 2008, these current data show movement in two directions. In 2008 almost every respondent classified organic innovation as being either more or much more important than it had been in the previous five years, 90%. In 2013, about 16 percent say organic innovation is less or much less important than it was five years ago; and 20% say the importance hasn't changed versus 10% five years ago. While there has been a slight increase today in folks saying that organic innovation is more important than five years ago, there has been a giant decrease in folks saying organic innovation is much more important. Only 14% say it is much more important today versus 45% five years ago [Figure B2].

Perhaps companies have made great progress augmenting their ability to create from within. Perhaps companies, Wall Street not withstanding, are finding greener innovation grass when they

look externally for newness. Perhaps having to juggle the acceleration of open innovation has diluted the emphasis on organic innovation. What is clear is that organic innovation clearly does not have the impetus and momentum that it had five years ago.

Figure B2
Perceived Importance Of Organic Innovation



R&D Operating Environment - Organization Philosophy

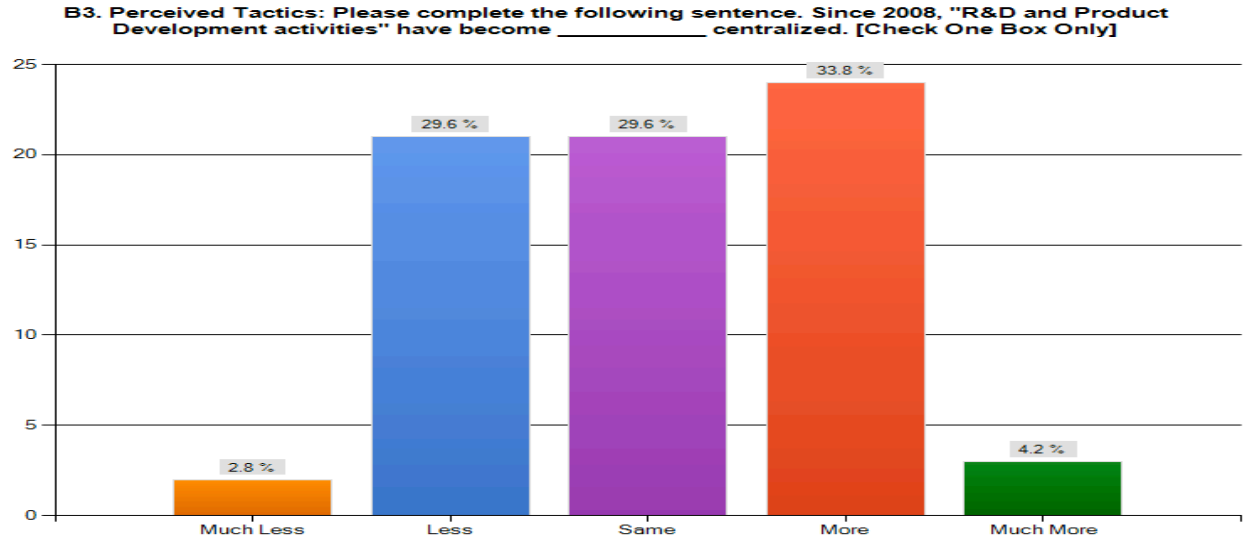
Folks with grey hair often scoff at the various changes companies attempt and/or undergo over time and then return to their former ways. A favorite subject in this domain is centralization vs. decentralization. This can manifest itself in the way a company makes decisions, the structure of its information systems, the number of physical locations it maintains, the geographic dispersion of a company, and a host of other operating parameters.

We examined the degree to which centralization might be occurring. We chose to research this because numerous studies have indicated that companies with tighter controls from the top often outperform companies that are loosely organized. With the advent of many more and stronger global competitors in the past five years, we were wondering of companies tightened their reigns to mitigate competitive forces.

These current data do not indicate any clear trend either way [Figure B3]. The number of companies that became less centralized is about equal to the number of companies that became more centralized. Both respondent groups are about equal to the number of companies stating they had no change at all during this period.

What is clear is that there is significant movement going on in both directions. Some 70% of respondents are moving one way or the other way. That degree of change is notable in itself.

Figure B3
Perceived Movement To A More Central vs. Decentral Operating Environment.



R&D Operating Environment - Number Of R&D Facilities

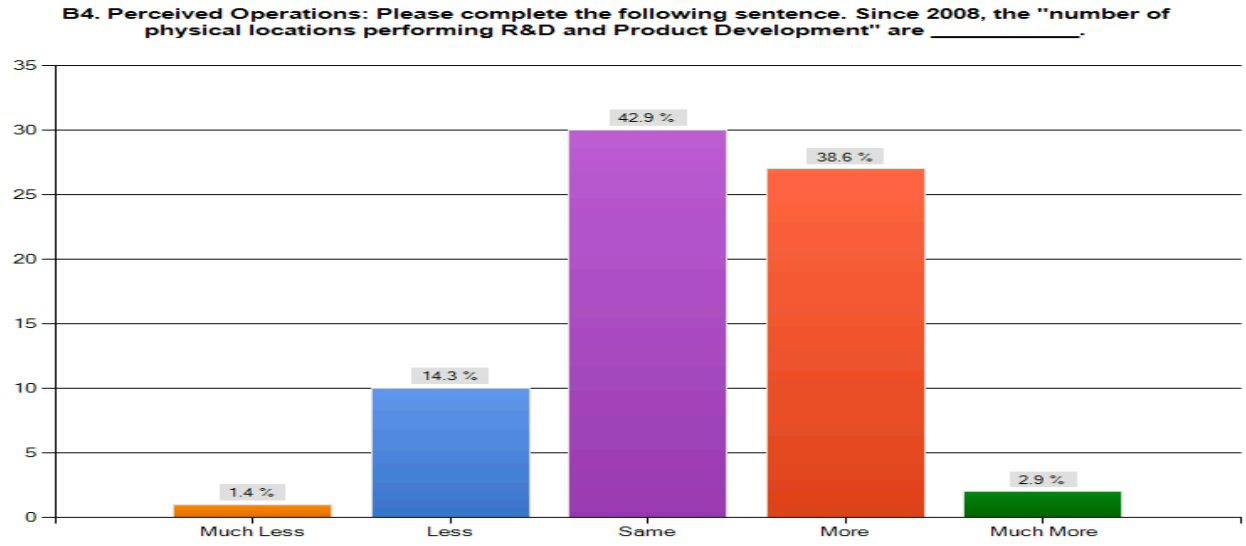
With more and more countries becoming significantly industrialized, we wanted to take a look at what was happening to the dispersion of the R&D organization [Figure B4]. In the 1990s, everyone was striving to sell products around the globe. In the early 2000s, there was a huge push to manufacture products around the globe. Some companies were aggressive in their policies to also bring their R&D and Product Creation/Development capabilities to be global and we regularly read about them in trade press. On the other hand, many were hesitant to risk their IP to less than secure geographies and countries. But most low-cost countries found ways to create disincentives for companies that only wanted to only wanted to sell into their country and/or take advantage of low manufacturing rates. Companies that brought their R&D capabilities as well had a leg up on the companies that were more protective of their intellectual property.

At the same time, as one by one the conservative companies had to appease country officials by increasing their level of local R&D, the number of facilities performing R&D increased. This dispersion stressed many companies ability to innovate cohesive product lines and families. Several large consultancies observed this stress and researched how companies were mitigating its effects.

In 2009, Booz & Company published a report examining the various advantages and disadvantages of the global footprints of today's corporations.[1] This report caught the attention of many corporate leaders and gave them some reasons to reign in the number of R&D locations operated by their company.

What is clear is that every corporation is being asked by every country to bring their R&D into that country and to not just sell and manufacture. If you lead a corporation, the pressure to disperse R&D is immense. "No" is the hardest word in the English language to say, especially if you are without good data.

Figure B4
Changes In Physical Locations Performing R&D



Well, these current data indicate that dispersion is still occurring at a significant rate and pace. But, some 15% of companies are reducing the number of R&D locations they maintain. One company in the sample is significantly reducing their locations. They must have read the research on saying yes to everyone that wants their company R&D to be local.

ORGANIC INNOVATION

Types Of Research & Development

For most of the 20th century, only the largest companies invested in research and pre-product development activities. Then, came the quest for innovation in the western world as it was

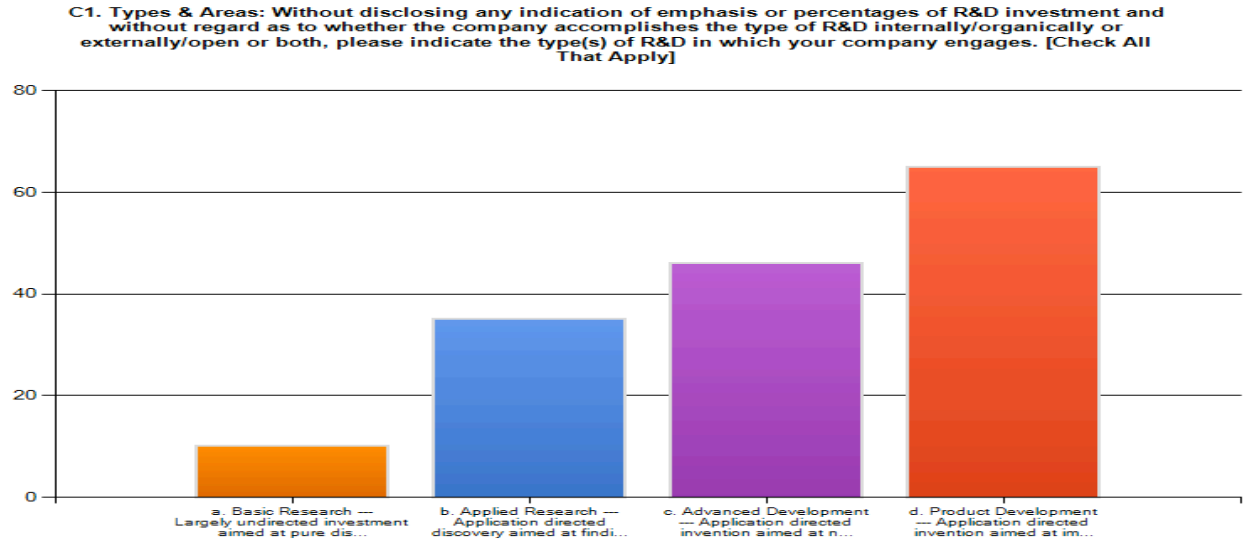
[1] Barry Jaruzelski and Kevin Dehoff, "Booz & Company 2008 Report: Beyond Borders -The Global Innovation 1000 Study Reveals A Global Shift In R&D Spending," Visions Magazine, PDMA – Product Development & Management Association, October 2009, Page 30, Exhibit 2: The Performance Payoff Of Global R&D.

ISBN13 978-1-937115-04-3

searching to change the basis upon which it competed with low cost countries. Many firms have documented that companies are moving some small part of their "D" budget to now be "R" and are increasing the number of R-related activities.

These current data show a number of companies across industries are now engaged in a significant amount of pre-product development activities [Figure C1].

Figure C1
Types Of R&D Performed By Today's Corporations



Simple visual inspection of the findings indicates that today's corporate practices are different than historical corporate practices in this regard.

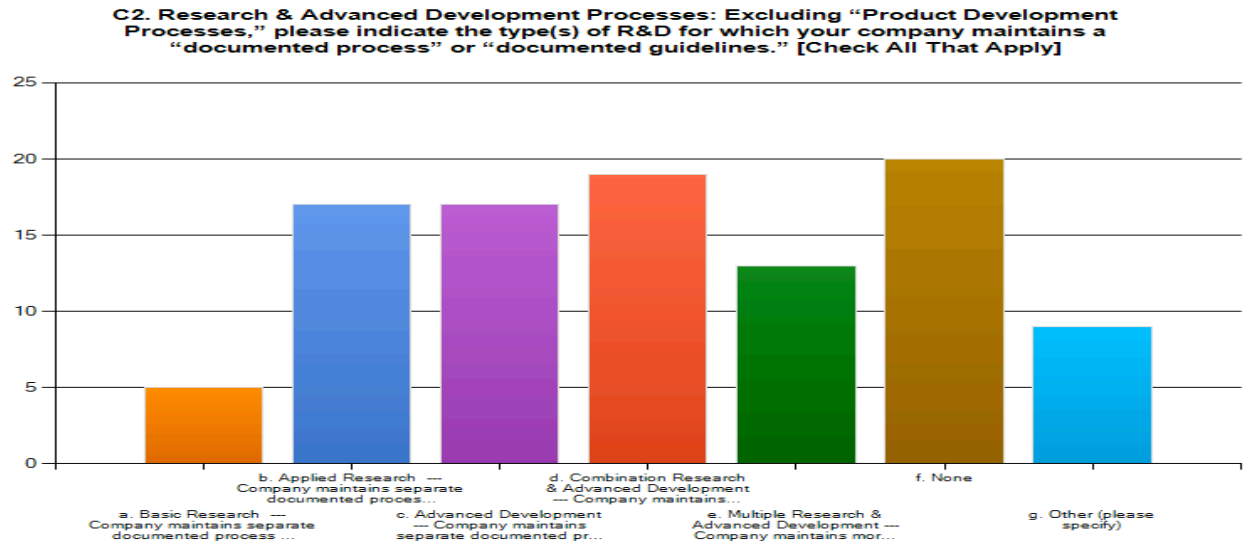
Formalization Of Pre-Product Development Processes

With more funding and increased activity in pre-product development activities, it should be expected that oversight and formalization will increase as companies shift to placing bigger bets on innovation - regardless of their stated strategy. Even companies with Extender strategies need to innovate to out-compete their Extender competitors. Innovation can be a strategy unto itself. It is also a component of all R&D strategies.

We examined this trend in our 2008 research and have now looked again five years later. In 2008, about 30% of companies responded they had no documented process for pre-product development activities. In 2013, this figure has dropped by a third [Figure C2]. Today, 80% of companies have either documented guidelines or a documented process for these earlier stage activities.

In 2008, the big formalization change from earlier in the century was in Advanced Development. Basic and Applied Research remained largely informal. In 2013, many more are reporting that their research-related activities have now become more formalized than they were in 2008. We expect this trend to continue for some time.

Figure C2
Pre-Product Development Documented Guidelines & Processes



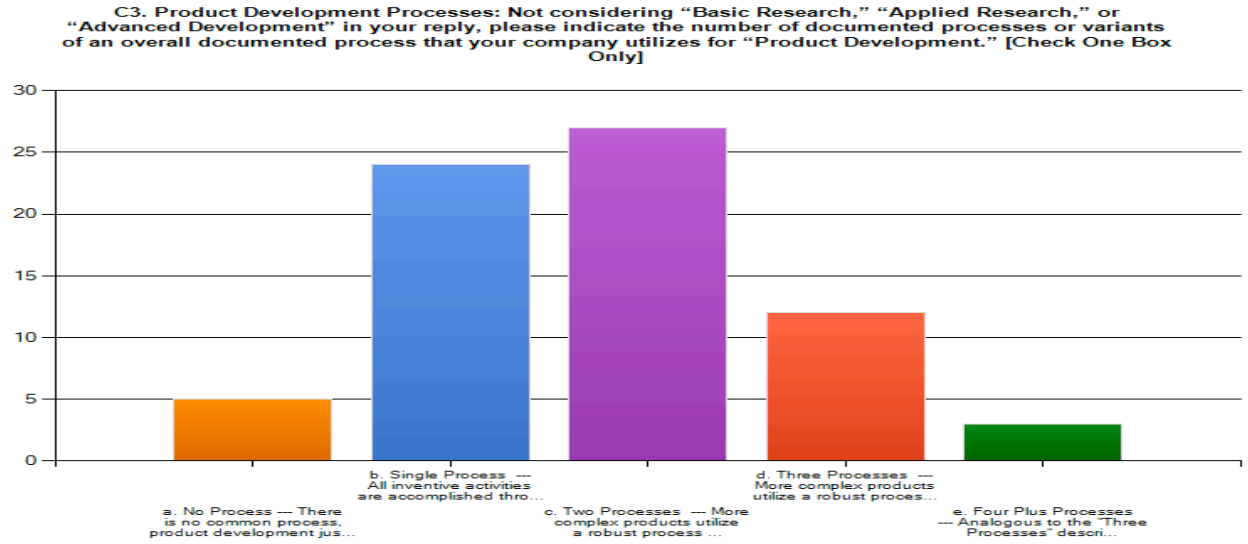
As happened with product development, stages and gates if you will, once initial formalized processes are put in place and tested for their robustness, further refinement becomes an ongoing activity.

Formalization Of Product Development Processes

Since Robert Cooper wrote the first edition of his now infamous "Winning At New Products[2]" book in 1986, corporations all over the globe have been adding and building out processes for product development. We have researched this subject several times since the late 1990s and are pleased to report that the additions and build-outs of new product development processes has apparently stabilized over the past five years, after meteoric growth during the previous two decades. In 2013, companies now seem to have what they wish to have in the way of formalized product development guidelines and processes [Figure C3].

[2] Cooper, Robert G., *Winning At New Products: Accelerating The Process From Idea To Launch*, Addison-Wesley Publishing Co., Reading, MA, USA, First Edition, Copyright © 1986, 358 pages.

Figure C3
Product Development Documented Guidelines & Processes



OPEN INNOVATION

The Importance Of OI

Henry Chesbrough[3] is often credited with coining and beginning the body of knowledge on the subject of Open Innovation [OI]. Open Innovation is the process a company undergoes to buy, barter, joint venture, ally, or otherwise acquire innovation and/or enabling capabilities from third parties and bring it to bear on the product offerings of their company.

Proctor & Gamble[4] seems to have had the most success at OI techniques over the years. Perhaps they have chosen to publish their good news more than others. Word on the street is quite mixed about OI[5], but in this global world OI is here to stay.

Our current research is our initial foray to research the subjects of Open Innovation. We find that about half of respondent companies say there has been no change in their emphasis over the past five years. We cannot determine from these data if there was a big push by these companies on OI in the early 2000s and therefore is a constant today, or if these firms never really got on the bandwagon. We believe that the 8-9% of companies that indicated the importance of OI today is

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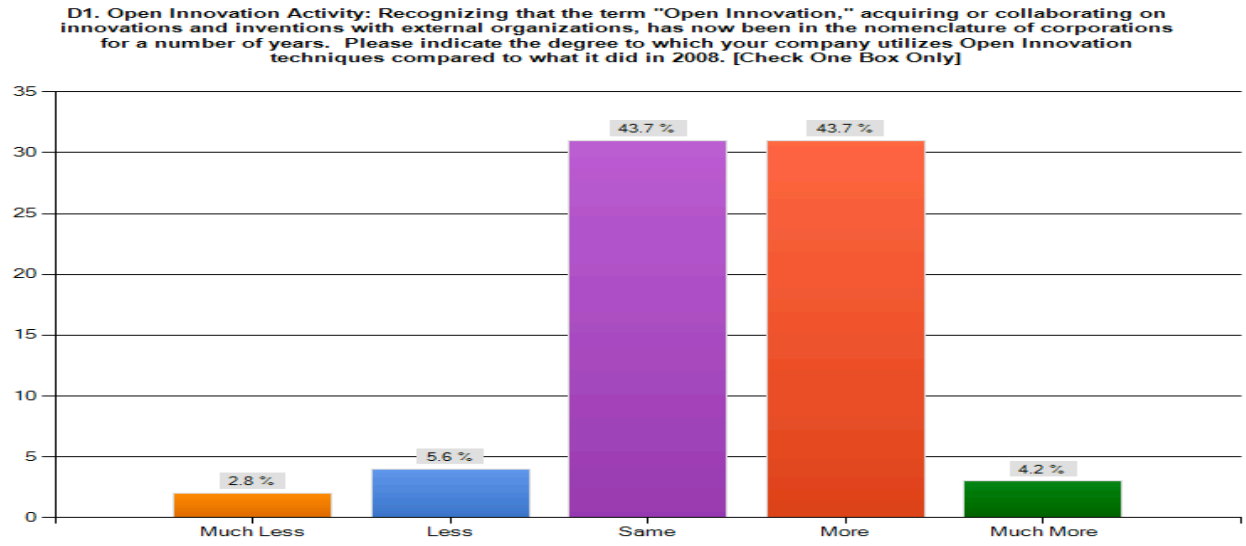
[3] Chesbrough, Henry, *Open Business Models: How To Thrive In The New Innovation Landscape,* Harvard Business School Press, Boston, MA, USA, Copyright © 2006, 256 pages.

[4] Bruce Brown and Scott D. Anthony, "How P&G Tripled Its Innovation Success Rate: Inside the company's new growth factory," Harvard Business Review, Harvard Business School Publishing, 60 Harvard Way, Boston, MA, 02163, USA, June 2011.

[5] David Matheson Ph.D., "Assessing The State Of Innovation: The Top Four "Must-Do" Areas of Innovation Practice," White Paper [Drawn From Frost & Sullivan Conference In Anaheim, CA In June 2010], SmartOrg Inc., 55 Oak Grove, Suite 202, Menlo Park, CA, 94025, USA, November 2011.

less or much less for them did try it and were not satisfied with the results. We believe that the 48% or so that said it was more or much more important today than five years ago are either late to the table or have had sufficient success and are moving forward with even more zest. What can be concluded is that about half of industry is pushing forward on OI [Figure D1].

Figure D1
Importance of OI To R&D Today



Returns From OI Activities

Not surprisingly, as infrastructure and systems for new initiatives lag the initiative itself, only a quarter to a third of companies have the tools in place to track the financial investments and results from OI [Figure D2].

We had anticipated the lack of OI infrastructure when we developed our research approach. We asked about the gut feel that managers had about the financial performance of the OI initiatives in which their companies were engaged.

One of the first rules of strategy is to not hurt yourself by trying something new. OI seems to pass that test [Figure D3].

Less than 5% of respondents indicated their experience was negative financially, and 60% said it was at least neutral. Encouragingly, about 35% said their returns were positive or strongly positive. Both the lack of a downside and the presence of an upside are reinforcing to the general belief in industry that OI is here to stay.

Figure D2
Financial Tracking Of OI

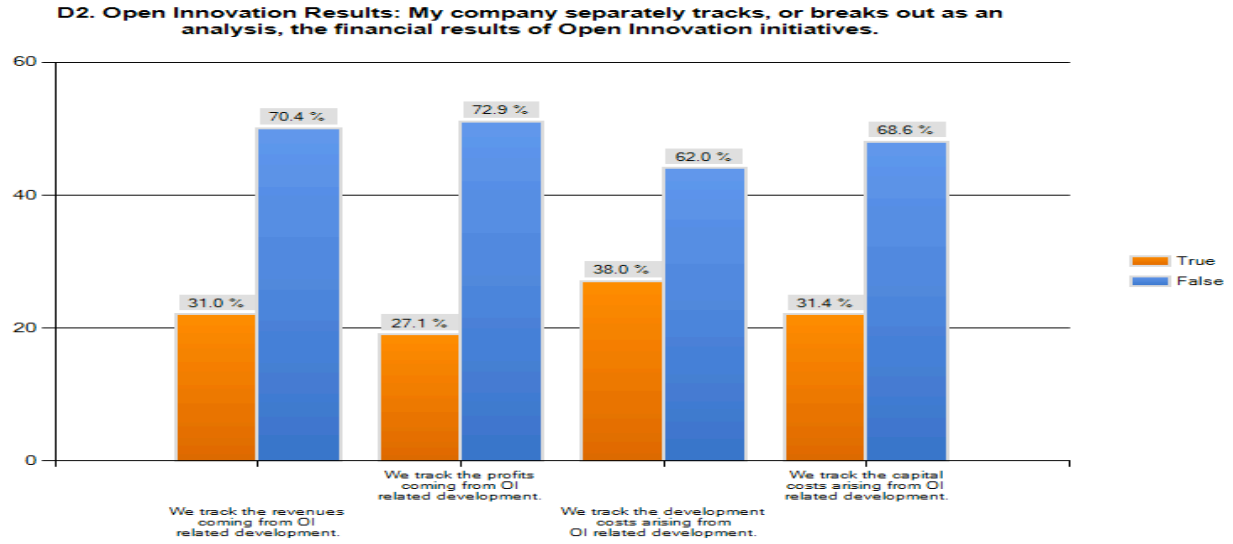
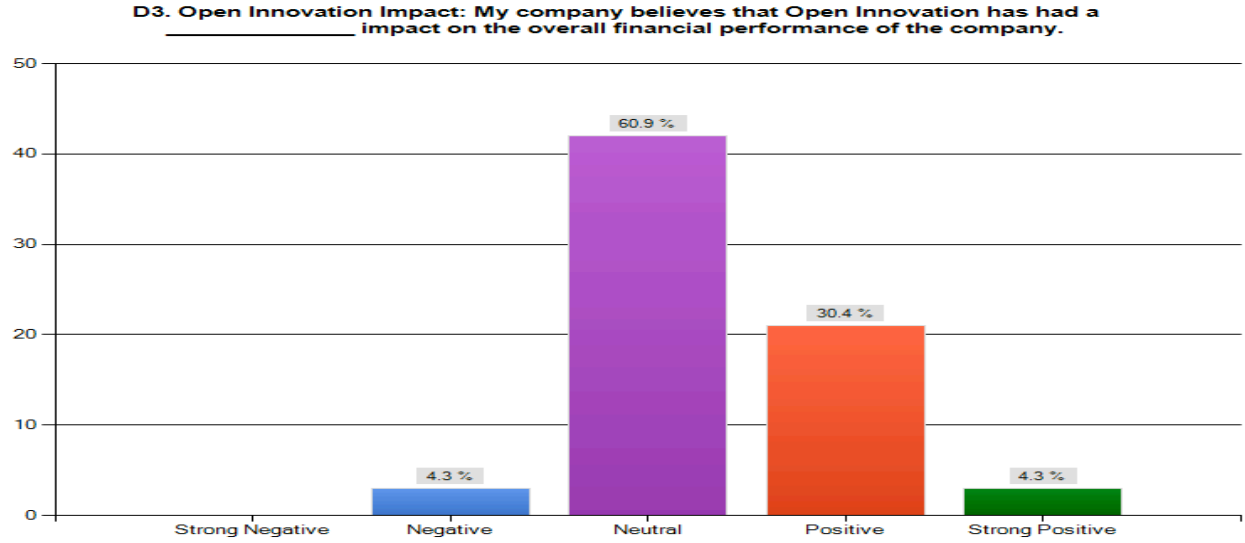


Figure D3
Perception Of The Financial Results Of Open Innovation Initiatives

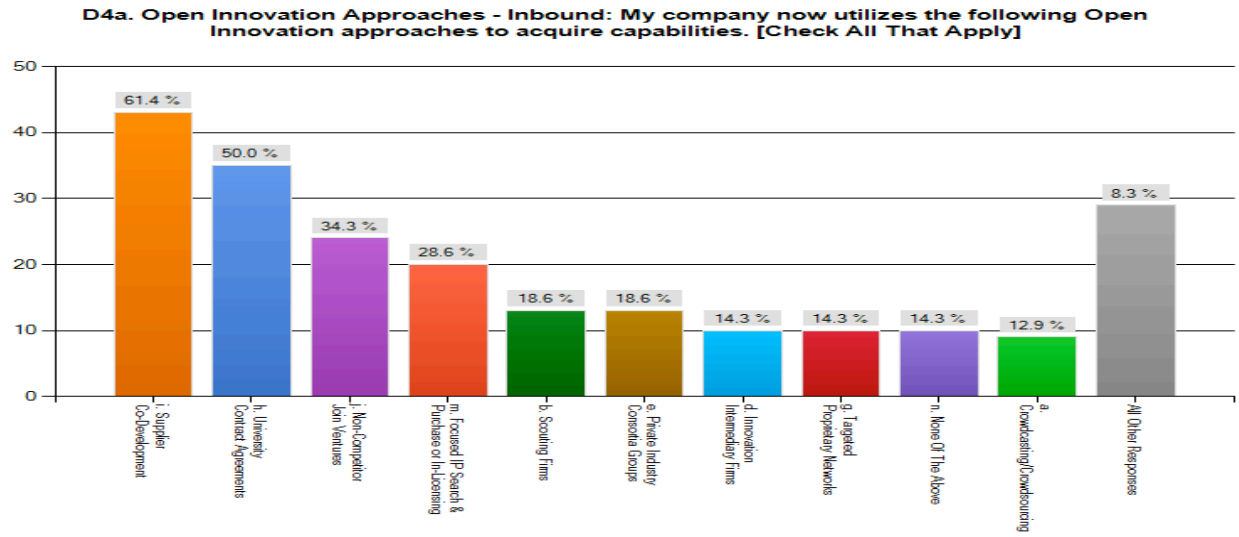


Enablers Of OI

As with any new business opportunity, the bleeding-edge and leading-edge companies experiment as to what works and begin the refinement of the practices that lead to the codification of the eventual body of knowledge. This number of years into OI, the fast follower companies have also engaged with the subject. Providers of enabling technologies, services, and software jump in to

make money once the demand from industry has reached a point that the market is big enough and money can be made. Clearly, a number of tools, techniques, and services to enable OI now exist [Figure D4a]. Not clear yet, are the ones that will stand the test of time.

Figure D4a
Enablers Of Open Innovation



The most popular technique is co-development with suppliers. We are a bit cynical about this finding. A strong argument could be made that that train has been on the tracks since the value-chain initiatives began in the 1980s. The same argument could be made for liaisons with universities, although that does seem to have increased significantly over what the experienced researchers at our firm would have considered to be an historical average. Fifty percent of companies now claim university liaisons as part of their approach to OI.

The other two findings that appear to be statistically significant are joint ventures with non-competitors and the acquisition or licensing of intellectual property from third parties. Around a third of respondents claim to be doing both.

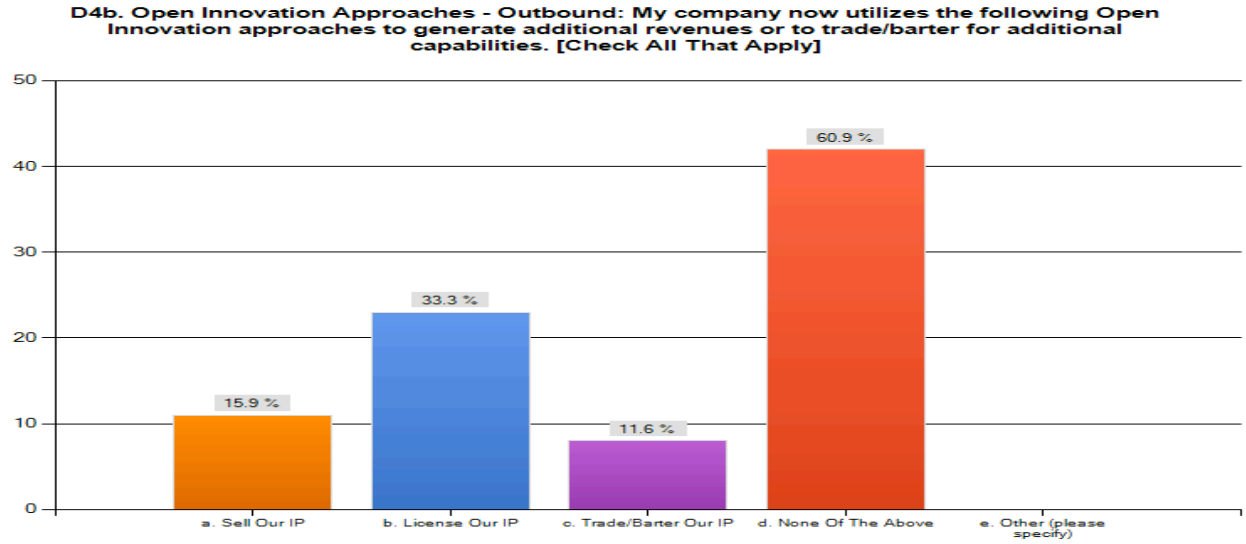
Our findings regarding the emergent professions and industries of scouting, consortia, networks, crowdsourcing, crowdcasting, and innovation intermediaries are not compelling enough except to say that they clearly exist and will be rationalized in their relative importance in the years to come.

Orchestrating OI Business Transactions and Processes

Having noted earlier that the presence of infrastructure and financial systems for tracking OI are still in their nascent stage, we also examined the techniques for arms-length OI transactions [Figure D4b]. While the overwhelming majority of respondents indicate there is little activity for

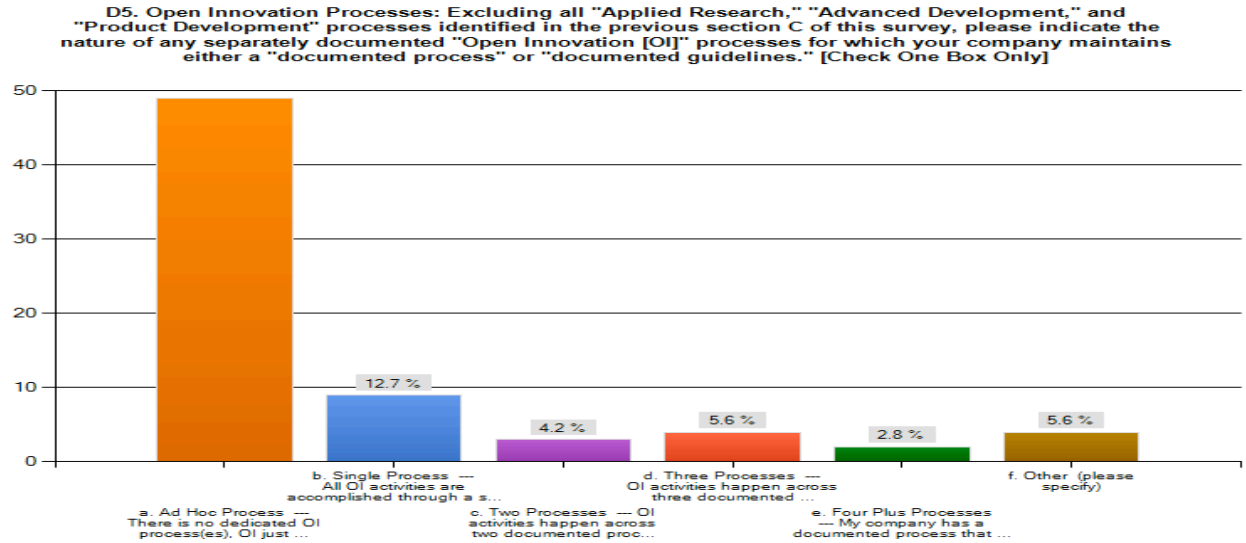
new approaches to arms-length transactions, these data suggest that there is an increase in the transacting of intellectual property through sale, licensing, trading, or bartering. We expect these intellectual property techniques to grow in the years to come.

Figure D4b
Arms-Length OI Business Transactions



Also still nascent are formalized processes and guidelines for OI activities [Figure D5.]

Figure D5
Documented Guidelines & Processes For OI Activities



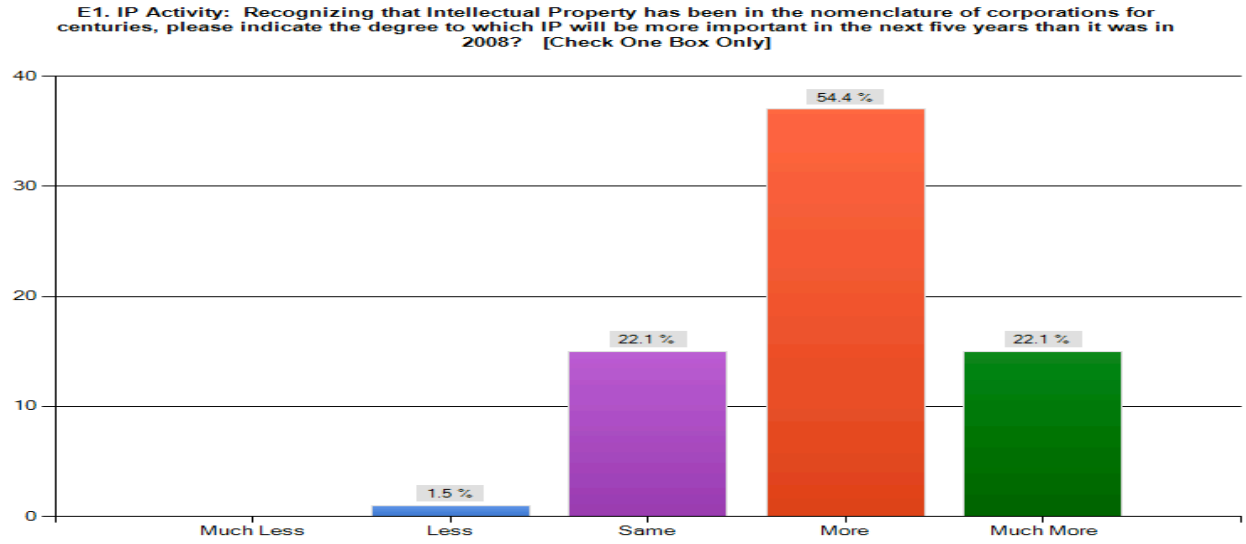
ISBN13 978-1-937115-04-3

INTELLECTUAL PROPERTY

The Importance Of IP

GGI has been forecasting, along with many others, the increase in importance of intellectual property [IP] for over a decade now. From every angle we know, this train is clearly on the tracks. While it may not move as fast as technologies change, or even at the slower pace at which processes change, it is clearly augmenting in its importance. An overwhelming 75% of respondents indicated that IP will be more or much more important in the next five years than in the past five years [Figure E1].

Figure E1
Importance Of Intellectual Property



Returns From IP Activities

Nearly uniformly consistent with our previously discussed findings on systems and infrastructure for open innovation, are our findings for intellectual property. Only a quarter to a third of companies have the tools in place to track the financial investments and results from IP [Figure E2].

We had anticipated the lack of IP infrastructure when we developed our research approach. We asked about the gut feel that managers had about the financial performance of the IP initiatives in which their companies were engaged.

Again, one of the first rules of strategy is to not hurt yourself by trying something new or increasing its emphasis. IP seems to pass that test [Figure E3].

No respondents indicated their experience was negative financially, and only 25% said it was neutral. Overwhelmingly, about 75% said their returns were positive or strongly positive. Clearly, IP is going to increase in its importance in the years to come.

Figure E2
Financial Tracking Of IP

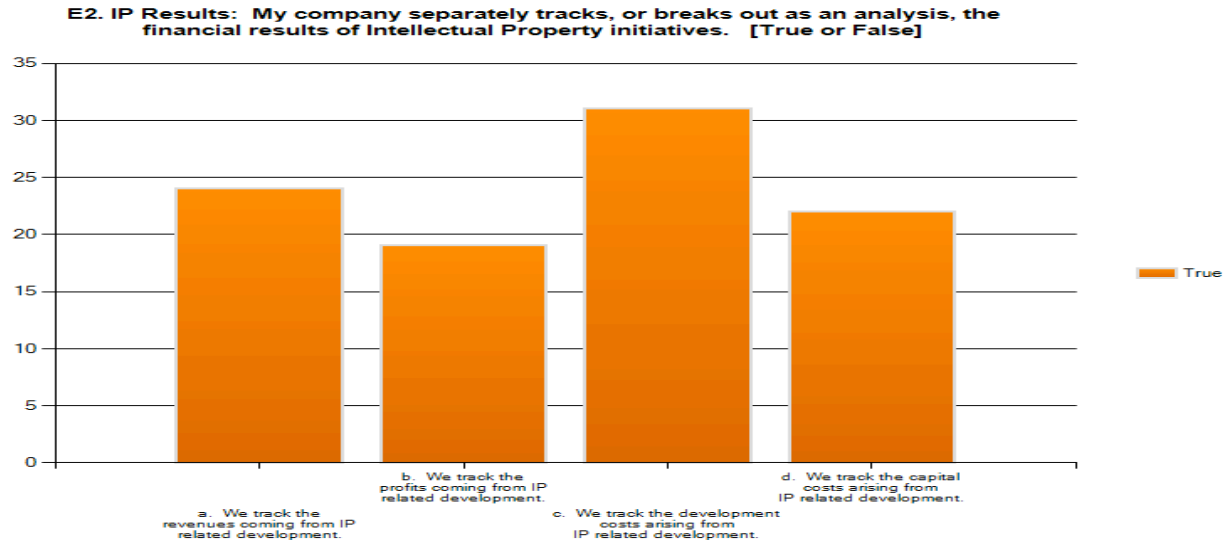
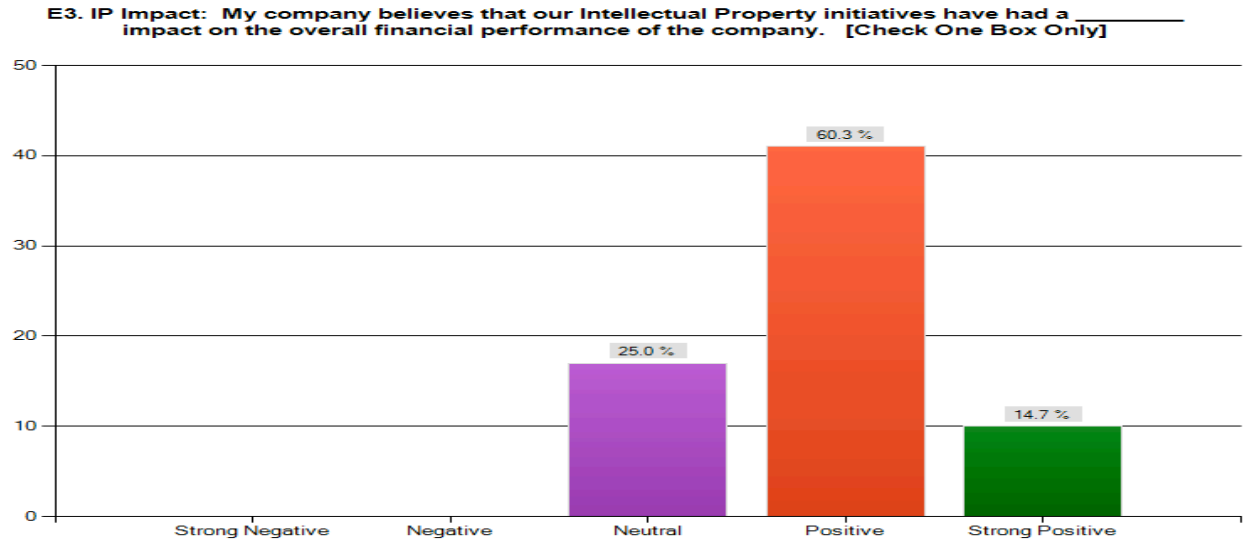


Figure E3
Perception Of The Financial Results Of Intellectual Property Initiatives



ISBN13 978-1-937115-04-3
BOOTHROYD-DEWHURST, INC. 28th International Forum on DFMA
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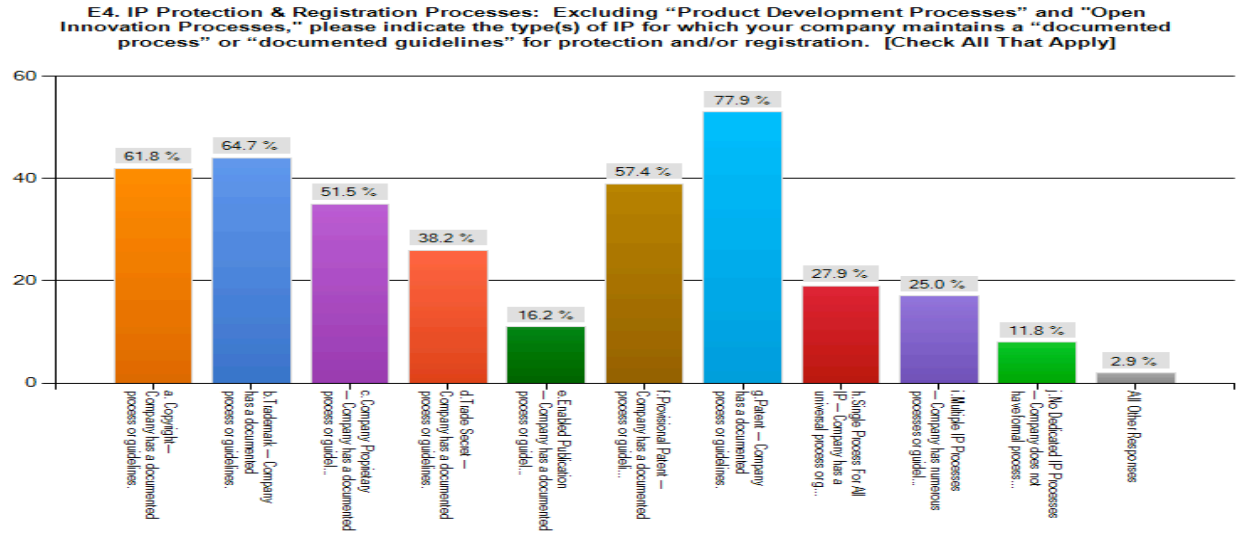
IP Guidelines & Processes

We sought to establish a baseline for future research on the presence/absence of formalized guidelines and processes for the various categories of IP [Figure E4]. These data are self explanatory. Our first snapshot in 2013 shows that the IP that is registerable across countries has the largest degree of formalization: Copyrights, Trademarks, Provisional Patents, and Patents. There are no surprises here.

Interesting, and a clear opportunity for the future now that First-To-File Legislation is now law in the United States as of March 2013, are the clearly less formalized processes for managing and protecting IP that is not registered. We will venture to predict that practices to protect "internal IP" will augment in the years ahead. Less people will have access to these internal capabilities and secrets and the corporate rules that govern them and access to them will increase.

Figure E4
Documented Guidelines & Processes For IP Activities

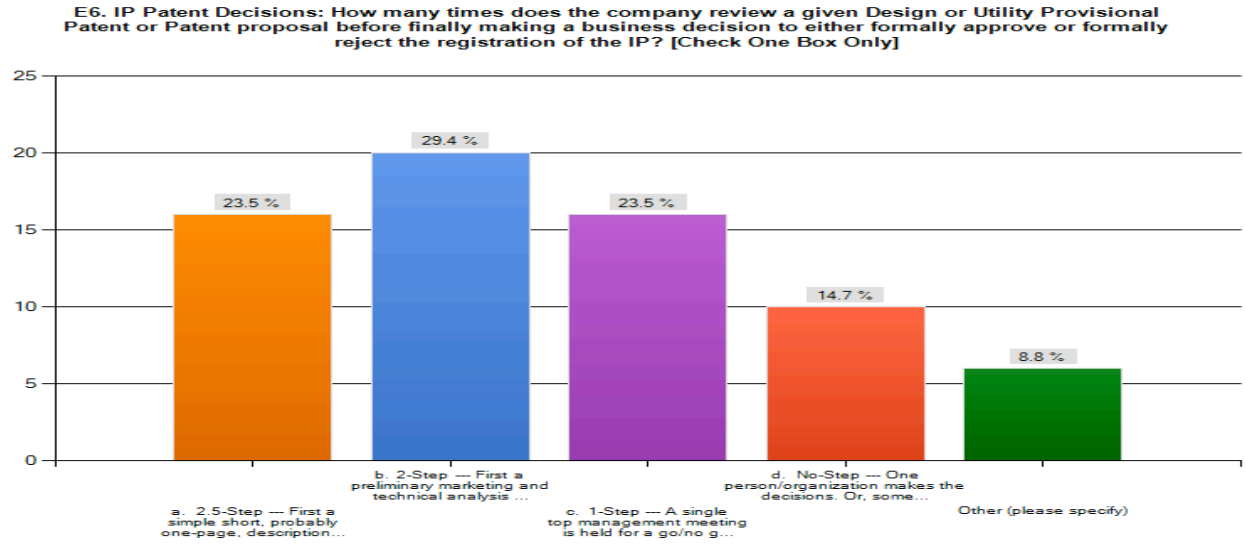


We will also venture to predict that the traditional approaches to decisions regarding IP will become more sophisticated. When industry closely examined the decision processes of product development in the late 1980s and early 1990s, they were archaic. We researched the number of decision steps and people involved in product development decision making in the 1990s. For this current research we asked respondents to identify their IP decision making process using the same categories that are considered to be robust for product development.

These data show that the current decision making processes for IP are nearly analogous to the maturation of the decision making process for products in the late 1980s [Figure E5]. By the late

1990s, ten years later, over eighty percent of companies had a multi-step decision process. We expect the same is going to happen for intellectual property.

Figure E6
IP Decision Making For Patents



In the very long run, we hypothesize that, for IP relating to product development activities, that the decision processes will become concurrent and probably will occur in the same meetings in which product development decisions are made today. IP, like products are already, is becoming rapidly monetizable. The two emanate from the same funding and investment. The two can generate revenue. It is not a big leap to forecast that new products and their associated intellectual property will be examined and decided together.

Summary

Apart from significant changes in R&D strategy that are taking place, both towards and away from risky innovation strategies depending on the company, the blocking and tackling in traditional product development processes and practices appear to be maturing after three decades of rapid evolution. As well, the corporate quest for improved Organic Innovation during the past decade appears to be subsiding. Companies seem to be reaching their comfortable level of entitlement for Organic Innovation capabilities in product development. The areas of research and advanced development are still quite dynamic however. The chips have been put down, but the hands are still playing themselves out. Processes and infrastructure are still evolving and maturing. Industry initiatives to raise total innovation capabilities will continue to influence these pre-product development activities for some time to come.

ISBN13 978-1-937115-04-3

Even more dynamic is the more recent industry initiative towards increased levels of Open Innovation. Open Innovation has all the attributes of a new market and industry that is still sorting itself out. Significant however, is that few believe they have a financial downside from pursuing OI. The first rule of good strategy and good management is not to hurt oneself. OI is perceived to be producing neutral to positive results. Remembering that almost half of new product launches have negative results, neutral is just fine for OI as it increases the number of alternatives available to a company in its quest for success.

Both combined with OI and independently of OI, the growth in the importance of Intellectual Property is second to none in the R&D-Product Development space. It also has a bearing on Organic Innovation. With the ability to monetize patents and other forms of IP, this subject will be dynamic for decades to come. Legislators and governments change slowly. Industry is sure to be waiting on them. Maturation cannot take place until it numerous countries treat it equally.

Infrastructure, processes, systems, and the ability to measure financial performance are lagging for both OI and IP. Best practices for both areas are still in the process of being culled out. Over time, we can expect to see a maturation process and path that will be quite similar to what has taken place for product development during the past thirty years. OI will not take as long as IP as corporations have direct control over the outcomes.

For professionals involved with R&D and product development, the next twenty years will be as exciting as the past twenty years. The challenges will be different, but the dynamism and the degree to which we must all learn on a daily basis will be even greater. In the not too distant future, product professionals will become proficient in acquiring innovation from outside their companies and in the legalese of IP that heretofore has been the realm of counsel.

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A Note About The Author: Bradford L. Goldense NPDP, CMfgE, CPIM, CCP is president of GGI. Founded in 1986, the consulting-market research-education company is recognized across the major industrial continents for expertise in R&D, advanced and product development, innovation, and the metrics that drive corporate performance. Mr. Goldense has worked with 200 of the Fortune 1000 and over 500 global manufacturing locations. GGI is based in Needham, Massachusetts.