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DSM – All out innovation
Key Features of DSM's Approach to Innovation

DSM is a company which has fully embraced innovation as one of its core concepts but more than that it has, through the publication of its annual reports provided considerable information on how it goes about the process of managing innovation. DSM is transparent about its innovation initiative.

What is most significant about DSM is the transition which has taken place over a period of 110 years. DSM has transformed itself from a commodity supplier to a provider of high value-added products and services.

This paper outlines some of the features of DSM's approach to innovation. White & Partners Ltd. has followed DSM since 2008. Our attention was drawn to DSM because of the openness with which it conducted its business, the information content of its annual reports and presentations and, most importantly, its explanation of innovation initiatives[1].

The focus of this paper is on DSM's innovation management practices and the breadth and depth of DSM's innovation initiatives. DSM, in its own words[2], wants to become 'an intrinsically innovative company, with excellent innovation practices, and with an above-average return on innovation investments and to employees to whom innovation comes naturally'. In short, innovation should become common practice. How does DSM do this? We explore its main management practices.

Contents of this paper

DSM's Transformation

DSM[3] began as a mining company in 1908; a commodity business if there ever was one. Fertilizers came next followed by petrochemicals and finally the company moved into higher-valued products specializing in life sciences and materials science. Throughout its history it has gained experience in bio technology[4] and it is this science area and deep interest in science overall that now plays into a strategic strength.

Today the company is active in high-end, value-added, products almost exclusively. It has a highly developed approach to innovation employing a variety of management initiatives to achieve their goals.

For a thorough presentation of the transformation from mining to life/material sciences there is no better source than Arjan van Rooij's book on DSM. There are two extracts which now seem even more important than ever.

> *Competitors often pose the main threat to a company. Responding to the innovations or other actions of competitors and defending the firm's commercial and technological position is therefore an important role of the industrial research laboratory*[5].

> *This book*[6] *is not about R&D as such; it is about the results of R&D and the relationship between R&D and business*

Innovation, while very much reliant on R&D in the broadest sense, is about linking business decision making to fundamental competencies of the corporation.

For over 100 years the company has managed to shift to new markets as old businesses became less attractive. Innovation has kept the company afloat. DSM's share price performance, while disappointing over the last decade, is now at historic highs. DSM is currently engaged in a strong move into international markets which now account for 39% of sales. To support this globalization, DSM is decentralizing many aspects of operations including some R&D activities. Perhaps this globalization effort is finally the means to satisfy shareholder expectations. After all, the Dutch, for centuries, have known how to run international businesses.

[1] Much of the information in this paper is drawn from DSM's Annual Reports of 2008, 2010 and 2011 and from investor analyst presentations made by senior management of DSM over the same period.
[2] DSM Annual Report 2008
[3] The Company That Changed Itself, R&D and the Transformations of DSM, Arjan van Rooij, Amsterdam University Press, 2007
[4] Investor presentation; 2011
[5] The Company That Changed Itself – p. 17
[6] The Company That Changed Itself – Forward by Jan Zuidam, Deputy Chairman of the DSM Managing Board

DSM's Current Business Profile

Business groups (groups are 'coherent product/market combinations') directors report directly to the Managing Board. By North American standards the management structure at the top is complex but this is consistent with the European model and with the DSM's following of the Dutch corporate governance code. Below the top-level structure DSM is currently organized into four clusters with centralized traditional corporate activities.

DSM's financial performance has, until recently, been somewhat lackluster with little upward movement in terms of revenue, employment, and share price. The last four years have been difficult times for many corporations so this is not a surprise. One might ask what would have been the result had there been little of no innovation success in terms of new products or markets.

Looking even further backward at the performance of the stock the value increase has been far from satisfactory. Peak prices were reached in 2008 with a value of 41.27 and previous two-year peaks were close at almost 40 Euros.

Year	2008	2007	2006	2005
Year end stock price	18.33	32.33	37.43	34.50

Most recent performance places share value at over 40 Euros. Dividend payment has risen from one Euro in 2005/2006 to 1.45 Euros.

	2011	2010	2009	2008
Revenue (Euros millions)	9193	9050	7866	9297
Workforce	22,224	21,911	22738	23591
Net Profit	14.9	10.0	7.2	11.9
EPS	3.66	3.27	1.44	3.64
EBITDA (%)/net finance costs	16.2	13.7	8.1	13.3
Innovation sales target – 2015 is 20%	18%	12%	810/sales??	600/net sales??
Net Sales per employee	407,000	413,000	346,000	394,000
ROCE (%)	14.3	15.0	7.2	14.4
R&D Expenditures (E millions) as % of net sales	5.3%	5.2%	5.1%	4.3%
Share price H/L	46.82/30.54	42.85/30.43	34.84/16.93	41.27/15.76
Share price end of year	35.85	42.61	34.46	18.33[7]

DSM currently has four clusters under two main categories; 1. Life Sciences: Nutrition and Pharma and 2. Materials Sciences; Performance Materials and Polymer Intermediates. Corporate activities include the Innovation Centre.

A brief description of each is noted below. More detailed information is available in DSM's Annual Reports. Data is from 2011 report.

Life Sciences Nutrition Cluster Continued Value Growth		Workforce	8329
In-depth knowledge of customer/market needs	Net sales: 3370 Euros millions		
Comprises DSM Nutritional Products (DNP) and DSM Food Specialties (DFS). The nutrition and food ingredients businesses serve the food and beverage, feed, personal care and pharmaceutical industries. Customized formulation activities Customer intimacy is a key success factor. Technologies in the Nutrition cluster are broad, utilizing DSM's competences in biotechnology (including fermentation), chemical process technology and particle engineering. DSM has the world's broadest ingredients portfolio and holds leading positions in many large ingredient markets for animal and human nutrition and health as well as personal care.			
Expenditure on R&D:2011	200 Euros millions	Sales per employee:	405,000 Euros
Chairman's comments	Our Nutrition business performed very well (in 2011).	DSM anticipates that its Nutrition business will continue to make further progress in 2012. EBITDA is expected to be above 2011.	

Life Sciences Pharma Cluster Leveraging partnerships for growth		Workforce	3324
Partnership with DSM Sinochem Pharmaceuticals	Net Sales: 677 Euros millions		
Pharmaceutical Products (DPP), one of the world's leading custom manufacturing suppliers to the pharmaceutical industry. The cluster also contains DSM's 50% interest in the DSM Sinochem Pharmaceuticals joint venture (DSP). DSP was formed from the former DSM business group DSM Anti-Infectives (DAI).			
Expenditure on R&D in 2011	67Euros millions	Sales per employee	204,000
Chairman's comments	In our Pharma cluster we took important strategic steps, but the cluster's performance still needs to improve.	EBITDA is expected to improve slightly compared to last year, despite the impact of the 50% deconsolidation of the anti-infectives business.	

[7] /average Shareholders Equity available to holders of ordinary shares in %

Materials Sciences Performance Materials Cluster **Growing via sustainable, innovative solutions**		Workforce	5599
Growth through innovation.	Net sales: 2,752 Euros millions		
Comprises DSM Engineering Plastics, DSM Dyneema and DSM Resins, specializing in the manufacture of technologically sophisticated, high-quality products that are tailored to meet customers' performance criteria. Materials are used in a wide variety of end-use markets: the automotive industry, the aviation industry, the electrical and electronics industry, the marine industry, the sports and leisure industries, the paint and coatings industry and the construction industry.			
Expenditures on R&D in 2011	128 Euros millions	Sales per employee	492,000
Chairman's comments	Our Performance Materials business made a good step up compared to 2010, although especially in the last part of 2011 it felt the effects of the uncertain economic climate that the world, and the Eurozone in particular, was experiencing.	EBITDA of the Performance Materials cluster is expected to be somewhat higher than in 2011.	

Materials Sciences Polymer Intermediates Cluster		Workforce	1439
Strengthening backward integration for DSM Engineering Plastics	Net Sales: 1,820 Euros millions		
Comprises caprolactam and acrylonitrile produced by DSM Fibre Intermediates (DFI). These products are raw materials for synthetic fibers and plastics. In addition, the business group produces ammonium sulfate, sodium cyanide, cyclohexanone and diaminiobutane.			
Expenditure on R&D in 2011	18 Euros millions	Sales per employee	1,264,767
Chairman's comments	Our Polymer Intermediates business had an extraordinary performance in 2011.	EBITDA will be clearly lower than the exceptional result in 2011. In 2012 three planned turnarounds in caprolactam, one in Q1 2012 and two more in Q3 2012, will also impact the results.	

In 2011organic sales growth was 11%, well above DSM's strategic target of 5-7%. All clusters, especially Polymer Intermediates, contributed to this growth. According to the Management Report, DSM is cautiously optimistic for the year 2012. DSM expects the second half of the year to be stronger than the first half, on its way to achieve the 2013 targets.

DSM's Global Initiative

DSM is embarked upon a major thrust into international markets, particularly China but also India and Latin America. Country Presidents have been appointed in China, India, Russia and Latin America. Innovation centers have been established in China and India and headquarters for DSM Fibre Intermediates has moved to Shanghai and DSM Engineering Plastics to Singapore. Research alliances have been established in Russia.

As decentralization gathers momentum the aggressive global initiative will test the company's management skills especially when it comes to innovation management. Only recently, with the extensive globalization taking place in China, India, Brazil and perhaps Russia and the desire to take advantage of this growth, have major corporations begun to decentralize research and development and other forms of innovation. As evidenced by other companies[8] reviewed by White & Partners Ltd. DSM is following a pattern with this emphasis on internationalization/decentralization.

DSM's Innovation Management Practices

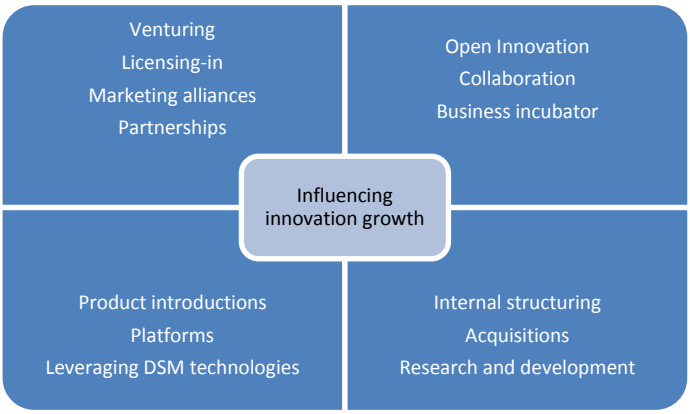
A special initiative called Vision 2010 was launched in 2005 – the intention being to give a boost to DSM innovation. Innovation goals were set in terms of the achievement of 'innovation sales' in absolute Euro terms. This measurement has since been changed to reflect the more normal corporate practice of measuring percent of sales of new products versus all products in a five-year period – but the intent was to measure success and report quite openly on achievement or otherwise.

The drivers of innovation, according to DSM are; research and development, product introductions, acquisitions, and open innovation and cooperation with the academic world[9]. Not much, however, is said about continuous improvement – the most common form of innovation. Continuous improvement is perhaps not newsworthy but, like Starbucks[10], if this area is neglected rising costs and poor financial performance can soon be a problem.

Of special interest to those following innovation is the use of a **self-assessment tool**, which the company developed together with McKinsey. The tool is intended to map the innovation practices in all business groups and compare them with practices in their peer and competitive[11] companies.

[8] See http://www.corporateinnovationonline.com for profiles of GE, P&G, Toyota, and John Deere
[9] Annual Report 2008
[10] See http://www.corporateinnovationonline.com for a review of innovation related to Starbucks' recovery
[11] Peer group: AkzoNobel, BASF, Ciba, Clariant, Danisco, EMS Chemical Holding, Lanxess, Lonza Group, Novozymes, Rhodia and Solvay

DSM confirms that the results from this self-assessment now confirm that DSM performs better than the industry average but the reviewer is not provided with any comment beyond this. It is therefore difficult to understand the scope of the tool, its rigor, and more importantly, how much better DSM is than its competitors.



DSM set up an **Innovation Centre** in 2006, which engages in venturing activities which are outside the mandates of the four business clusters. The Centre's stated purpose is to:

- target innovation-driven revenue,
- extend the technological base of DSM,
- establish an improved innovation process and
- establish an innovation-oriented culture.

Initiatives have the objective of contributing to or becoming new 'platforms'. In a sense the Centre is a rallying point around potentially new 'platforms'; i.e. those innovation interests which give promise of becoming more significant to DSM but where it is inappropriate to put the initiatives within the current four business clusters. This management practice is consistent with approaches taken by 3M, P&G and others who see the importance of applying different performance criteria to fledgling initiatives.

DSM took steps to engage its employees around the world through the use of an **Employment Engagement Survey**. Introduced in 2007, it has now been used three times. A total of 19,800 employees (with a response rate of 91%) participated in the most recent survey. According to DSM, favorable responses were up from the first survey but flat when compared to 2010 results. None-the-less it is an attempt to communicate with and understand the needs and aspirations of its global workforce. This initiative is included as part of innovation initiatives since, according to our research[12], a number of factors under the heading of communication, listening to people, etc. are part of a culture which encourages innovation. Testing this dimension of innovation is very relevant to innovation success.

DSM Venturing became most active in 2007. Venturing engages in situations which could prove relevant to its business groups and may invest directly or through partnerships or even in venture capital funds. Investments range from Euros 250,000 to 5million with participation in the 5% to 20% range, clearly a minority interest. Venturing is a participant in 20 companies and 11 funds so this is a very active part of DSM's innovation initiative.

With its **Functional Excellence in Innovation program** the company wants to raise the innovation bar even further, since it aims to be among the top innovation performers in the business. The Excellence in Innovation program focuses on five key areas:
- Market understanding
- The innovativeness of the business groups
- The delivery of DSM's top 50 innovation projects
- Entrepreneurship
- Performance orientation

Research and Development[13] (R&D) plays a key role in the realization of DSM's innovation strategy. Most of the annual R&D expenditure – at close to 4.2% of sales - is directed toward business-focused R&D programs. In addition, DSM has a corporate level research program in place to build and strengthen the technological competencies the company needs to execute development projects.

DSM[14] undertakes projects, staffed by **multi-disciplinary teams.** As an example, teams consisting of researchers specialized in genetics, fermentation process experts work alongside of material scientists. According to DSM, this arrangement provides 'DSM with unique opportunities for value creation, which cannot easily be matched by others in the industry. 'Real (radical) innovation is often achieved through 'cross pollination' between technologies and businesses.

In addition, DSM uses a **portfolio management** scheme to ensure a good balance between incremental and radical innovation. This facilitates discussions on the composition of the innovation portfolio and will help optimize the mix between incremental and radical innovation within the company. For the radical part of DSM's innovation portfolio, a global, company-wide portfolio approach has been adopted. This confirms a **long-term focus** on Life Sciences and Materials Sciences as the key pillars of DSM's strategy and will help make sure that the **cross-fertilization** between the two fields is actively stimulated. The Managing Board decides on the composition of this portfolio.

DSM has set up a **uniform reporting system on innovation** which has contributed to a clear overview of the current portfolio of innovation projects. The approach is dynamic and projects are required to pass through various 'stage gates' in the pipeline. An example in the Nutrition cluster[15]: 40 projects netted 20 which were moved to a later stage – a success rate of 50% (P&G expects to fail 50% of the time and if it does not have this failure rate, there is concern that it is not innovating). Similarly in the Performance Materials cluster, projects move through the process and lead to new products or 'platforms'. In 2008, the goal was to achieve Euros 200 million by the year 2010 and this was achieved by keeping the pipe line full of worthwhile projects. The gates to the process are entitled; idea generation, business feasibility, development, scale-up validation, and lastly, transfer to running business.

[12] See http://www.corporateinnovationonline.com for a list of 25 Factors impacting innovation
[13] DSM Annual Report 2008
[14] DSM Analysts Conference 2007, Presentation by Rob van Leen, Chief Innovation Officer
[15] Ditto

To keep the right balance and focus in its innovation efforts, the company also makes sure that non-viable products and processes are stopped and that good opportunities that are not consistent with the corporate strategic focus are spun out. Ideas that enter the Open Innovation funnel go through a Project Management Process (PMP). The funnel is continuously fed with embryonic business ideas. Potentially successful new products or new processes leave the funnel as they are ready to start their contribution to the strategic goals of the business.

Opportunities and ideas that could lead to new platforms are gathered in a threefold approach: via the DSM Innovation Center, via individual business groups and at the regional level. A form of stage gating, which DSM has been using for many years to steer individual innovation projects, is now used to steer platforms.

DSM has established its own **'Business Incubator'** aimed at exploring even other opportunities where, based on DSM established technologies, opportunities could emerge. Future 'platforms' are sought. Often this initiative is done in collaboration with industry partners and current and future customers. Goals are explicit but are estimated to be achieved over a longer term that one or three years; the example provided suggests achievement of 1 Billion Euros by 2020 with average profitability in 2020. The DSM Business Incubator serves as the cradle for future emerging business areas. Within the Business Incubator, DSM explores opportunities in new areas where its technologies can meet current and future market demands.

These innovation platforms draw on DSM's broad and deep competences, have real and significant commercial potential and address the key global trends in food, health and energy. Developments include (but are not limited to) the following:
- Bio-based food and feed processing ingredients
- Food and feed ingredients with health/performance benefits
- Bio-based clean/green materials for coatings, automotive and electronics
- Materials for life protection and sports
- New business models, for example, the brand licensing strategy of DSM Dyneema
- EBAs: DSM Bio-based Products & Services, DSM Biomedical and DSM Advanced Surfaces

According to DSM, **less than 5%** of the embryonic business ideas ultimately result in economically viable products and processes.

The DSM **Learning Architecture** consists of four program clusters: Executive Programs, Management Programs, Functional Programs and e-Learning Programs. This architecture creates a common and coherent concept of learning and program design, facilitates the development of a DSM learning culture and provides enhanced learning for talent. The programs are designed and delivered in close cooperation with leading international business schools and global training providers (IMD, Wharton, Erasmus University) and are supported by a diverse internal faculty, primarily consisting of DSM's Top Management.

Joint venturing is another of the management practices employed as exemplified by its recent venture with POET to make bio fuels. Additionally, a joint venture with Dupont (Actamax) has been announced.

DSM has recently developed a **Business Innovation Analysis** (BINA) methodology in order to systematically explore innovation opportunities. The six sources of innovation include (in random order):
- Brands and Design,
- Business Model / Monetization,
- Market and Application,
- Business Biotope,
- Process / Costs, and
- Technology.

The basis for the BINA is the Innovation Dataset including 'mega trends, business position, opportunity landscapes and capabilities. These four basic elements are made specific in a Business Innovation Dialogue to finally create strategic opportunities.

A summary of DSM's innovation management initiatives is provided in the following chart, Checklist for Innovation Management Practices. The 'x' indicates a well-established presence in DSM's adoption of each marked initiative. There are two features which stand out either because no insight can be provided or the evidence is to the contrary.

- While DSM is the recipient of many awards for its developments – and these are well documented in the various reports – there is little mention of awards to individuals within DSM or mention of the existence of a special award system for innovators per se. While the desire is to make DSM intrinsically innovative and therefore everyone is that way, it would not be a surprise that certain individuals stand out. Innovation management practices of U.S. headquartered companies such as 3M, GE, typically have a means of recognizing outstanding individual innovative performance. Perhaps DSM's culture is different than that found in the U.S.

- Many corporations have appointed a CIO, as did DSM. If this position has changed, why has it changed?

On the subject of transparency, DSM has two other rather unique reporting features. The Managing Board hires an outside firm – KPMG - to provide 'assurance on the information in the DSM Triple P Report 2008[16] – issued by DSM and used as part of this review. As further indication of DSM's transparency, the Report provides a section entitled 'What still went wrong'.

All in all, DSM is an impressive company in the manner by which it has transformed itself over decades and its approach to innovation.

April 25, 2012

[16] See DSM Triple P Report 2008 for more details

Innovation Management Practices[17] Check List Successful management of innovation				In place
Innovation Management Initiatives		**Examples from DSM Practices**		
Employee/stakeholder surveys relating to innovation				
	The scope of the survey is not available but it is assumed that the survey would touch on matters at least related to innovation; such as communication, rewards etc.	2011: % report up from first survey in 2007		x
Dedicated organization arrangements to spur innovation				
	Use of technical, business and executive champions			?
	Use of task forces	Multi-disciplinary teams		x
	Use of venture teams			?
	New venture division	DSM Venturing established.	Explores emerging markets and technologies.	x
	Business incubation	Innovation Centre works to establish new growth 'platforms'.		x
	SBU proliferation	Not yet in common use		
	New business development within SBU	Separate centers established.		x
Acquisition/Divestiture				
	Strategic acquisition	10 partnerships and acquisitions in addition to Sinochem and Martek		x
	Spin-off	JV on bio fuels global licensing		x
	Spin-in	Not evident		
Financial Mechanisms designed to spur innovation				
	Corporate venture capital	DSM Venturing		x
	R&D partnerships	Many examples		x
	Licensing	Intention in bio fuels joint venture		x
Technological structure designed to broaden and deepen innovation competencies				
	Central R&D	Established an Innovation Centre at corporate level.	DSM has a corporate research program focused on development projects.	x
	Decentralized R&D	DSM is in the process of establishing centers in China and India.		x
	Balanced R&D	So stated in annual report		x
	Contract out	No evidence of total outsourcing related to innovation		
Strategic alliances aimed at marrying internal with external competencies				
	Joint venture	Worked with Crucell N.V. on breakthrough initiative.		x
	Three-tier venture	Engagement in Biomedical – a public private partnership		x
	Supplier partnerships			?
	Customer partnerships	DSM Dyneema with Badinotti		x
	Union partnerships	Perhaps not relevant given European model		
	Privileged relationship; with a source of technology	Dupont, POET		x
	Government-sponsored venture			?
Corporate governance and innovation values aimed at spurring innovation				
	Outside advisory group	Governance follows classic structure	No outside innovation group	
	Strengthened Board role	No change evident re innovation		
	CIO role	Was evident in 2008	May not be present?	?
	Corporate value re-orientation	Development of 'Vision 2010' – set out in 2005, commitment to innovation.	DSM should become 'intrinsically innovative'	x
	Customer viewpoint	Business groups focus		x
	Idea generation management	Implemented a project-management approach dedicated to innovation.		x
	Measuring innovation	Adopted % new product sales as main measure.	DSM uses a tool developed by an external consulting group.	x
	Incentives/rewards for innovators	Not evident for individuals.		
	Open collaboration	Interaction with industry partners and technology thought leaders re Life Sciences and Materials Sciences.		x

[17] Check list content was initially developed by staff of Arthur D. Little Inc. and subsequently adapted and modified by White & Partners Ltd.