Innovation Management Master Program

15 May 2019
Welcome!

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Program Manager Innovation Management
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Overview of the Innovation Management Program

Busting the IM-OML myths

Q&A, including student experiences with Milan Grünewald

CHECK WWW.IM-MASTER.NL FOR SLIDES & INFO
The need for Innovation Managers

- Innovation is essential for the competitive position of companies
  - win new customers
  - strengthen loyalty of existing ones
  - start-ups help address customer needs in entirely new ways

- However, many new products and businesses fail
- The competitive environment is dynamic and unstructured, which magnifies wrong managerial choices

\[
\text{PROFIT} = \text{REVENUE} - \text{COST}
\]

To increase this... increase this... or decrease this
The need for Innovation Managers

- Innovation is essential for the competitive position of companies
  - win new customers
  - strengthen loyalty of existing ones
  - start-ups help address customer needs in entirely new ways

- The Innovation Management program teaches quantitative and qualitative theories, tools, and techniques to make businesses and entrepreneurs more innovative as well as more successful in their innovation activities.
The many facets of innovation: It’s connected!
The many facets of innovation: It can be radical!
The many facets of innovation: It’s everywhere!

Virtual stores

Augmented reality

No pay checkout
The many facets of innovation: Killing your darlings

Nikon cancels DL compact series citing high development costs

Published Feb 13, 2017 | Allison Johnson

[Nikon camera image]
Innovation Management framework

Entrepreneurship: idea generation and opportunity identification

NPD: portfolio management and strategic decision-making

HRM: selecting talent, matching skills and tasks, incentivizing, managing teams

Business strategy: Alliances, networks, eco-systems, open innovation
Operations research: supply chain mgmt

Marketing: launch tactics, sales strategies, after-sales service

Marketing: market research, customer co-creation

Information Systems: business intelligence, big data analytics

Entrepreneurship: finance and intellectual property rights
Innovation Management building blocks

CONTENT

- New product development
- High-tech marketing
- Organizational strategy and change management
- Sales and after-sales service management
- Human resource management
- Business intelligence
- Open innovation
- Entrepreneurship
METHODOLOGIES AND TOOLS

- Multivariate statistics
- Structural equation modeling
- Data mining
- Computational intelligence
- System dynamics modeling
- Design science methodology
- Calculus; differentiation & integration
- MatLab
- Meta-heuristics for optimization of operational processes
- Econometric valuations
- Real option analysis
- Data Modeling (UML)
- Process Modeling (BPMN)
## Program: Year 1 (2019/2020)

<table>
<thead>
<tr>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1ZM16 Management of Product Development</td>
<td>Track Elective</td>
<td>1ZM11 Marketing and Innovation</td>
<td>1ZM130 / 1ZM140 Design Science Methodology and Project</td>
</tr>
<tr>
<td>1JM06 Human Aspects of Innovation</td>
<td>Track Elective</td>
<td>1BM110 Data Analytics for Business Intelligence</td>
<td>Track Elective</td>
</tr>
<tr>
<td>1ZM31 Multivariate Statistics</td>
<td>Track Elective</td>
<td>1ZM65 System Dynamics</td>
<td>Track Elective</td>
</tr>
</tbody>
</table>
Track = Set of courses on same theme.
Select at least 5 out of 9.
EXCELLENCE TRACK (TOP 10%)

BUSINESS AND PRODUCT CREATION TRACK

MANAGING INNOVATION PROCESSES TRACK
Business and Product Creation Track

<table>
<thead>
<tr>
<th>Idea Development</th>
<th>Concept Development</th>
<th>Concept-to-Launch</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Discovery</td>
<td>Build Business Case</td>
</tr>
<tr>
<td></td>
<td>Scoping</td>
<td>Development</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Testing &amp; Validation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Launch</td>
</tr>
</tbody>
</table>

Gate 0  Gate 1  Gate 2  Gate 3  Gate 4  Gate 5

$  £  €  ¥
**Business and Product Creation Track**

**FOCUS**
Front-end of the innovation process, where individuals think about setting up their own business, and where established companies start the development of new and innovative products

**KEY WORDS**
Creative idea generation, opportunity identification, entrepreneurial actions, breakthrough projects, radically new products, exploration, new business models, start-ups

**TYPICAL JOBS**
Product developer, innovation strategist, innovation manager, strategy consultant, business developer, business engineer, entrepreneur (CEO), project manager

**COMPETENCIES**
Creativity, ability to cope with uncertainty, qualitative research skills
Business and Product Creation Track

Q2 – 2019/2020
- 1JM100 Management of organizational change and innovation
- 1ZM20 Technology entrepreneurship
- 1ZM120 Entrepreneurial marketing
- 0HM220 Network society
- 0EM160 Innovation and Intellectual Property Rights

Q4 – 2019/2020
- 1BM20 Business Analysis for IT Systems
- 1ZM60 Selling new products
- 1ZM70 Entrepreneurial finance
- 1ZM90 Open innovation

Choose 5 out of 9, you may replace one with a free elective

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<thead>
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<td>1JM05</td>
<td>Human Aspects of Innovation</td>
<td>Track Elective</td>
<td>1BM110 Data Analytics for Business Intelligence</td>
<td>Track Elective</td>
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<tr>
<td>1ZM11</td>
<td>Multivariate Statistics</td>
<td>Track Elective</td>
<td>1ZM155 System Dynamics</td>
<td>Track Elective</td>
</tr>
</tbody>
</table>
CURRENT STUDENTS: WHY DID YOU PICK THIS TRACK?

▪ “I am more interested in the creation of new products and businesses. I have already started multiple small businesses and I want to enhance myself in doing this.”

▪ “I am an entrepreneurial student. I'm always working on business. For example I am now starting a company called X. Another clear reason is because I am a creative person. I'm always looking for new things.”

▪ “I think that business and product creation will always be done almost entirely by people rather than software packages. So, in order to secure my future as much as possible, I think it is also the best choice to choose for a branch which will be mostly dependent on people.”
Managing Innovation Processes Track

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Gate 0 | Gate 1 | Gate 2 | Gate 3 | Gate 4 | Gate 5 |

$ £ € ¥
Managing Innovation Processes Track

**FOCUS**
Larger innovation projects (in terms of budget) and decisions that managers have to make to move new products through the development stages and finally launch it on the market, including the monitoring and continuous improvement of product/service performance.

**KEY WORDS**
Marketing research, marketing strategy, process management, product lifecycle management, big data intelligence, sales and after-sales service management, product quality and reliability.

**TYPICAL JOBS**
Business analyst, marketing manager/consultant, key account manager, sales manager, service manager, manager R&D department, project manager, strategic buyer, purchasing and supply chain manager.

**COMPETENCIES**
Planning and optimization, systematic, quantitative research skills.
Managing Innovation Processes Track

Q2 – 2019/2020
- 1BM05 Business process management
- 1JM30 Managing team dynamics and team performance
- 1JM100 Management of organizational change and innovation
- 1ZM40 Strategy & technology management
- 1ZM55 Service engineering & marketing

Q4 – 2019/2020
- 1JM21 Designing effective performance mgmt systems
- 1CM15 Project and process management
- 1ZM60 Selling new products
- 0EM190 Infonomics

Choose 5 out of 9, you may replace one with a free elective

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<tr>
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<td>Track Elective</td>
<td>1ZM157 Data Analytics for Business Intelligence</td>
<td>Track Elective</td>
</tr>
<tr>
<td>2ZM11 Multivariate Statistics</td>
<td>Track Elective</td>
<td>1ZM02 System Dynamics</td>
<td>Track Elective</td>
</tr>
</tbody>
</table>
CURRENT STUDENTS: WHY DID YOU PICK THIS TRACK?

- “The monitoring and improvement of a product sounds interesting to me. I also like that it still holds on more to the logistic side of the Industrial engineering bachelor.”
- “I am more motivated to launch products on the most optimal market, in the most optimal form, at the most optimal time, through the most optimal channels.”
- “I would like to work on large innovation projects in larger companies instead of starting my own entrepreneurial company. Besides that, I am more interested in quantitative research. Also in the future I hope to work as a manager or consultant and not as a developer.”
Program: Year 2

<table>
<thead>
<tr>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free Elective (may be international)</td>
<td>Free Elective (may be international)</td>
<td>Master thesis</td>
<td>Master thesis</td>
</tr>
<tr>
<td>Free Elective (may be international)</td>
<td>Free Elective (may be international)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Free Elective (may be international)</td>
<td>Free Elective (may be international)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Excellence Track: Three options

1. DUAL DEGREE

2. EXCELLENCE TRACK

3. HONORS ACADEMY
Excellence Track: 1. Dual Degree

Allows you to complete two masters

Currently popular combinations:

- Innovation Management – Innovation Sciences
- Innovation Management – Operations Management and Logistics
- Innovation Management – Industrial Design

Other “logical” combinations:

- Innovation Management – Human Technology Interaction
- Innovation Management – Mechanical Engineering
- Innovation Management – Medical Engineering
- Innovation Management – Computer Science and Engineering
Excellence Track: 1. Dual Degree

- For top 10% students
- Program suggested by student and validated by two program managers
- Program consists of minimum 165 ECTS, maximum 195 ECTS
- Satisfies minimum demands of two Master programs

Thesis
- 45 ECTS
- Features topic on intersection of the two Master programs
- Two mentors, one from every Master program in the dual degree

More info? Ask the program manager of IM (i.e., me) and/or other program
Excellence Track: 2. “The” excellence track

- A special program integrated with an M.Sc. Program for selected excellent and ambitious students (20 ECTS “on top of”, 10 ECTS integrated)

- Two options
  - Track in research – more info through Prof. Paul Grefen
    - Two mini research projects + PhD courses
    - Development of extra research skills
    - Ideal preparation for PhD student after completion of the master program
  - Track in design – more info through Prof. Noud Gademann
    - Program offered through Jheronimus Academy for Data Science (JADS), Den Bosch
    - On a contract to prepare for and execute a design project for a specific company
    - Ideal preparation for PDEng Program for designers (e.g. at JADS)
Excellence Track: 3. Honors academy

- Stand-alone or combination with “the” excellence track (option 2)
- Honors academy offers a program for development personal skills – with a load of 5-20 ECTS
- Enrollment for excellent students, via Research Director (Prof. Paul Grefen)
- Check procedures on Honors Academy web site: https://educationguide.tue.nl/programs/tue-honors-academy/master-students/
MYTHBUSTERS
Myth 1: IM is “soft” and “fuzzy”

- 1ZM31 Multivariate Statistics is core course in IM
- 1BM110 Data Analytics for Business Intelligence is core course in IM
- 1ZM65 System Dynamics is a core course in IM

<table>
<thead>
<tr>
<th>IE&amp;IS ALUMNIMONITOR 2015</th>
<th>IM (N=40)</th>
<th>OML (N=51)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory / practice ratio</td>
<td>2.58 (sd=0.59)</td>
<td>2.55 (sd=0.73)</td>
</tr>
<tr>
<td>Depth and detail</td>
<td>3.00 (sd=0.55)</td>
<td>3.06 (sd=0.68)</td>
</tr>
<tr>
<td>Apply skills to solve engineering problems</td>
<td>3.75 (sd=0.95)</td>
<td>3.94 (sd=0.73)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NATIONALE STUDENTENENQUETE 2018</th>
<th>IM</th>
<th>OML</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contents</td>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>General skills</td>
<td>4.3</td>
<td>4.1</td>
</tr>
<tr>
<td>Academic skills</td>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Preparation for professional career</td>
<td>3.7</td>
<td>3.6</td>
</tr>
<tr>
<td>Internship experience</td>
<td>4.4</td>
<td>3.8</td>
</tr>
<tr>
<td>Pursuit of excellence</td>
<td>3.8</td>
<td>4.1</td>
</tr>
</tbody>
</table>
### Myth 1: IM is “soft” and “fuzzy”

<table>
<thead>
<tr>
<th>END-OF-MASTER SURVEY 2017/2018</th>
<th>IM</th>
<th>OML</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sufficient preparation in previous program</td>
<td>4.0</td>
<td>4.1</td>
</tr>
<tr>
<td>5 or more electives outside IE&amp;IS</td>
<td>25%</td>
<td>10.9%</td>
</tr>
<tr>
<td>Engineering profile of core courses</td>
<td>3.9</td>
<td>3.4</td>
</tr>
<tr>
<td>Engineering profile of elective courses</td>
<td>4.3</td>
<td>4.2</td>
</tr>
<tr>
<td>Challenging program</td>
<td>4.2</td>
<td>4.2</td>
</tr>
<tr>
<td>Confidence in technical skills</td>
<td>3.5</td>
<td>3.8</td>
</tr>
<tr>
<td>Ability to consider all stakeholders in solving engineering problems</td>
<td>4.5</td>
<td>3.8</td>
</tr>
<tr>
<td>Overall grade for master program (10pt)</td>
<td>7.7</td>
<td>7.8</td>
</tr>
</tbody>
</table>
Myth 1: IM is “soft” and “fuzzy”

Some course evidence: System Dynamics logistic growth model

\[
Net \ Birth \ Rate = g^* \left(1 - \frac{P}{C}\right)P = \frac{dP}{dt}
\]

\[
\int \frac{dP}{(1 - \frac{P}{C})P} = \int g^* \, dt \quad \int \left[\frac{1}{P} + \frac{1}{C - P}\right] \, dP = \int g^* \, dt
\]

\[
\ln(P) - \ln(C - P) = g^* t + \ln(P_0) - \ln(C - P_0)
\]

\[
\frac{P}{C - P} = \frac{P_0 \exp(g^* t)}{C - P_0}
\]

\[
P(t) = \frac{C}{1 + \left(\frac{C}{P_0} - 1\right) \exp(-g^* t)}
\]
Myth 1: IM is “soft” and “fuzzy”

Some course evidence: System Dynamics Logistic Growth Model

\[ \text{Rate} = g^* (1 - \frac{P}{C}) P \]

\[ \int \frac{dP}{-P/P^*} = g^* t \]

\[ \ln(P(t)) - \ln(P(0)) = g^* t + \ln(P_0) - (C - P_0) \]

\[ P(t) = \frac{C - P_0}{P_0} \exp(-g^* t) \]
Myth 2: IM students are not as smart as OML students

IM

2018/2019: enrollment 80

- Premaster: 29%
- Other TU/e major: 29%
- IE / TBdk: 28%
- Other NL university: 12%
- Foreign: 2%

OML

2018/2019: enrollment 152

- IE / TBdk: 72%
- Other NL university: 8%
- Foreign: 3%
- Premaster: 16%
- Other TU/e major: 1%

### Myth 2: IM students are not as smart as OML students

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>IM</th>
<th>(N)</th>
<th>Type</th>
<th>OML</th>
<th>(N)</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1ZM16</td>
<td>Management Of Product Development</td>
<td>0.72</td>
<td>89</td>
<td>Core</td>
<td>0.75</td>
<td>16</td>
<td>Elective</td>
</tr>
<tr>
<td>1JM06</td>
<td>Human Aspects of Innovation</td>
<td>0.78</td>
<td>82</td>
<td>Core</td>
<td>0.85</td>
<td>21</td>
<td>Elective</td>
</tr>
<tr>
<td>1ZM31</td>
<td>Multivariate Statistics</td>
<td>0.81</td>
<td>85</td>
<td>Core</td>
<td>0.92</td>
<td>100</td>
<td>Elective</td>
</tr>
<tr>
<td>1ZM11</td>
<td>Marketing and Innovation</td>
<td>0.73</td>
<td>79</td>
<td>Core</td>
<td>0.67</td>
<td>6</td>
<td>Elective</td>
</tr>
<tr>
<td>1BM56</td>
<td>Business Intelligence</td>
<td>0.86</td>
<td>73</td>
<td>Core</td>
<td>0.86</td>
<td>96</td>
<td>Elective</td>
</tr>
<tr>
<td>1ZM65</td>
<td>System Dynamics</td>
<td>0.90</td>
<td>67</td>
<td>Core</td>
<td>0.92</td>
<td>24</td>
<td>Elective</td>
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<tr>
<td>1BM20</td>
<td>Business Analysis For IT Systems</td>
<td>0.85</td>
<td>7</td>
<td>Elective</td>
<td>0.72</td>
<td>11</td>
<td>Elective</td>
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<tr>
<td>1CM15</td>
<td>Project And Process Management</td>
<td>0.83</td>
<td>40</td>
<td>Elective</td>
<td>0.90</td>
<td>10</td>
<td>Elective</td>
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<td>1JM11</td>
<td>Performance Enhancement</td>
<td>0.71</td>
<td>7</td>
<td>Elective</td>
<td>0.52</td>
<td>100</td>
<td>Core</td>
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<tr>
<td>1JM21</td>
<td>Designing Effective Performance Mgmt Systems</td>
<td>0.83</td>
<td>29</td>
<td>Elective</td>
<td>0.89</td>
<td>35</td>
<td>Elective</td>
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Myth 2: IM students are not as smart as OML students

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<tr>
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<td>0,75</td>
<td>Elective</td>
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<td>1</td>
<td>Elective</td>
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<td>40</td>
<td>0,52</td>
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<tr>
<td>1JM21</td>
<td>Designing Effective Performance</td>
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<td>0,89</td>
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### IE&IS Alumnimonitor 2015

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<th>IM (N = 40)</th>
<th>OML (N = 51)</th>
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<tr>
<td>Start salary (average, gross in Euro’s)</td>
<td>2531</td>
<td>2750</td>
</tr>
<tr>
<td>First job search duration (average, in months)</td>
<td>1.23</td>
<td>1.58</td>
</tr>
<tr>
<td>Fit between education and first job (sd = 1.28)</td>
<td>3.47</td>
<td>3.85 (sd = 0.88)</td>
</tr>
<tr>
<td>Current contract hours (average)</td>
<td>39.76</td>
<td>39.60</td>
</tr>
<tr>
<td>Satisfaction in current job (5 point scale) (sd = 0.86)</td>
<td>4.28</td>
<td>4.02 (sd = 1.02)</td>
</tr>
<tr>
<td>Career perspectives of current job (4 point scale) (sd = 0.68)</td>
<td>3.44</td>
<td>3.15 (sd = 0.82)</td>
</tr>
</tbody>
</table>
**Myth 3: IM provides a poorer career perspective than OML**

**Nuttig advies**

Met hun studietijd nog vers in het geheugen, hebben Leanne en Joost als afsluiting bruikbaar advies voor de huidige generatie studenten. Leanne: “Het meest waardevolle advies dat ik ooit heb gekregen is dat je altijd naar jezelf moet luisteren. Doe dingen die je leuk vindt. Niet alleen qua nevenactiviteiten maar vooral ook qua vakken en de masterrichting die je kiest. Zoals je hebt gezien hebben Joost en ik een andere master gevolgd met totaal andere keuzevakken en toch vervullen we dezelfde functie. We kiezen weliswaar andere projecten, gezien onze interesses, maar we zijn allebei opgeleid met dezelfde analytische, oplossingsgerichte vaardigheden.”
Myth 3: IM provides a poorer career perspective than OML
Myth 3: IM provides a poorer career perspective than OML

BUSTED
Objection: “But all my friends pick OML, shouldn’t I just follow?”

Answer: If you do not dare to be different, working in the domain of innovation is probably not for you, indeed!