Innovation for Growth in SMEs: Exploring Successful Innovation Practice

Dr. Lawrence Dooley
Overview

1. Why Innovate and its literature bias
2. Importance of SME’s
3. LMT and HT SME differences
4. Irish LMT SMEs cases
5. Exploring SME Innovation (Outcomes, processes & capabilities)
6. Discussion
7. Implications (theoretical and policy level)
Is Every Organisation Innovative?

Yes!
They are or have been in the past.
Effective Innovation: three key questions

- How will we *Create* value?
- How will we *Deliver* value?
- How will we *Capture* value?

Henderson, 2003
Obsession with R&D

Today, 95% of all empirical innovation research is focusing on R&D as an explanatory variable (Becheikh et al. 2006; Barge-Gil et al. 2008; Arundel et al. 2008).

Low and Medium-low technology (LMT) sectors not fitting this model (Arundel et al. 2008; Barge-Gil et al. 2008).

LMT sectors dominated by SME firms, often based in indigenous firms.

Highly important to economic well-being and regional employment but has become the ‘forgotten sector’ (Hirsch-Kreinsen, 2008).

Incomplete understanding of innovation management and especially for SME community.
Low and Medium Tech firms (LMT)

- **“High-tech”**
  > 7% share of R&D expenditures on total sales

- **“Medium-tech”**
  2.5 to 7% share of R&D expenditures on total sales

- **“Low-tech”**
  < 2.5% share of R&D expenditures on total sales

**Industry-level**
- R&D-intensive industries
- Non-R&D-intensive industries

**Firm-level**
- Highly R&D-intensive firms
- R&D-intensive firms
- Non-R&D-intensive / non-R&D-performing firms

*Legler and Frietsch (2007)*

Source: Som, 2016
## Low and Medium Tech firms (LMT)

### ISIC REV. 3 TECHNOLOGY INTENSITY DEFINITION

Classification of manufacturing industries into categories based on R&D intensities

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Sectoral classification based on BERD from OECD 1997 and revised 2011 (R3)
LMT pressing need

- LMT sectors account for over half of all EU innovating firms (Arundel et al 2008)
- Accounts for 40-60% of industrial value added and more than half of industry-based employees in EU (Hirsch-Krensen, 2008, Rammer et al, 2011, Som and Kirner, 2015)
- Dominated by SME’s, which account for more than 90% of European firms.
- Highly embedded in regional and national supply chains and local markets (Som and Kirner, 2015).
- Despite limited R&D, such non-R&D active firms have legacy of achieving innovation and sustainability contrary to accepted theoretical best practice and policy trajectories.
SME’s important and innovating

Figure 11: Organisational innovation rates by size class, 2014–2015

Source: CSO Ireland
SME challenges

Figure 14: Factors hampering innovation activities by sector, 2014–2016

- Lack of internal finance
- Lack of external finance
- Innovation costs too high
- Lack of skilled employees
- Lack of collaboration partners
- Difficulty obtaining Government grants/subsidies
- Uncertain market data
- Too much competition in your market

% of enterprises

Source: CSO Ireland
SME’s not all the same

- **High Tech**
  - Relatively young
  - Experienced management team
  - Small but large firm currently small or gone?
  - Adequately financed
  - Singularly focus of technological novelty at heart
  - Higher profit margins
  - Global view
  - Open to exit strategy

- **Low and Medium Tech**
  - More established
  - Family/regional management team
  - Larger in scale but conservative growth
  - Bootstrap/ debt financed
  - Dyadic perspective of current market and future
  - Tight profit margins
  - Often geographically constrained view
  - Embedded in region/identity

SME and Innovation literature skewed towards high tech firm model
"Innovation is the process by which firms master and get into practice product design and manufacturing that are new to them, whether or not they are new to the universe or even the nation" (Nelson and Rosenberg, 1993: 4)
Research aim

Context
• The forgotten SME sectors of low and medium-low tech firms that represents the sector majority

Questions
• Accepting they innovate to remain sustainable then where does this occur?
• How do achieve innovation (in absence of R&D)?
• What capabilities underpin their innovation efforts?
• What can be done to enhance sector’s sustainability and growth?

Method
• Qualitative approach necessary
• Development of relationship with more than 45 growth SME cases across the R&D intensity spectrum to ‘get under the hood’
  — Animal feed, meat processing, food, brewing, furniture, steel fabrication, apparel, plastics, agricultural machinery, specialist engineering, medical devices, ICT.
Irish SME case analysis

• *Tidd and Bessant’s 4P’s model of innovation trajectory:*
  – Product, Process, Position, Paradigm

• *Multiple open ended interviews*
  – Management team
  – Chronological intervals
  – Research By Wandering About
  – Variation even within industry sectors with phenomena of “high-tech firms in low tech industries”.
**SME innovative comparison**

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Sample LMT case innovations

| Firm #1 | Animal feed Inc  
| Ireland- NutX | Supplier for animal feed for regional agricultural base  
| 70 employees  
| Family & professional mgt.  
| Technical process specialist | Product extension and process ‘licencing’ out |
| Firm #2 | Metal bash Inc  
| Ireland- Alt Steel | CMO producer of widgets  
| 110 employees  
| Entrepreneur and prof. mgt.  
| Established reputation for quality, reliability and agility | Process innovation driving new product lines and position innovation |
| Firm #3 | Food Inc  
| Ireland- YogX | Producer of high end dairy products  
| 45 employees  
| Family owned & managed  
| Specialised supplier and strong customer focus | New market position and co-creation through supply chain network |

All financially constrained and markets tending towards commodization

Very limited history of R&D (e.g. technological SOA)
## Innovation differences across spectrum

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<th>Innovation trait</th>
<th>LMT</th>
<th>HMT</th>
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<tr>
<td>Management experience</td>
<td>More on-job and insular</td>
<td>More varied and dynamic</td>
</tr>
<tr>
<td>Product offering</td>
<td>More toward commodity</td>
<td>More towards novel</td>
</tr>
<tr>
<td>Market served</td>
<td>Closer to base</td>
<td>More global orientated</td>
</tr>
<tr>
<td>Customer focus</td>
<td>More B2C orientated</td>
<td>More B2B orientated</td>
</tr>
<tr>
<td>Innovation Management</td>
<td>More unstructured and informal</td>
<td>More structured and systematic</td>
</tr>
<tr>
<td>Innovation order winner</td>
<td>Cost efficiency and responsiveness</td>
<td>Value-adding opportunity</td>
</tr>
<tr>
<td>Dominant innovation activity</td>
<td>Process</td>
<td>Product</td>
</tr>
<tr>
<td>Innovation frequency: Product</td>
<td>More incremental and sporadic*</td>
<td>More radical and routine</td>
</tr>
<tr>
<td>Innovation frequency: Process</td>
<td>Ongoing</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Perception of patents, etc</td>
<td>Not really relevant to business</td>
<td>Necessity for growth (Financing cycle)</td>
</tr>
<tr>
<td>Innovation culture/ routines</td>
<td>More tacit and champion based</td>
<td>More explicit and systematic</td>
</tr>
<tr>
<td>Open Innovation</td>
<td>Limited and necessity driven</td>
<td>More exploratory and purposive</td>
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Product innovation

• Customer responsiveness & Design are drivers of NPD
• Struggle for novelty reinforcing cost dimension and lack of clear value added impacting IPR
• Strategies
  – (1) Typically incremental in nature, heavily skewed toward core business (known-known) and specific collaboration necessity driven
  – (2) Process innovation capability spill over (experimentation)
  – (3) End-product producers increasing technological base \ servization of products to avoid ‘commodity hell’ (higher tech firm in LMT)
• Advantage:
  – Close to customer and creative experimentation
  – Flexibility, design and process knowledge (Team)
  – *Challenge of SKU proliferation and low volume
  – * IP fallacy
Process innovation

• Necessity driven process innovation, spilling over into NPD
• Heavy customisation of plant and purchase of 2\textsuperscript{nd} hand equipment (*Creative adaption and frugal mindset*)
• Key innovation capability but often under appreciated internally due to long-term evolution (Unknown-known)
• Advantage
  – Tacit knowledge/ on-job learning underpinning problem solving
  – Deep relationships with supplier base (externally sourced R&D)
  – *Slack required for experimentation impeded by day-to-day pressures.*
Position innovation

- Geographically constrained due to organic growth
- Limited and primarily vertical or niche in nature
- Either unintentional or last resort to crisis
  - Organic take-over based on increasing success
  - Leverages existing technical and market expertise for problem solving
  - Reinforces project based nature
- Stimuli
  - Entrepreneurial opportunity recognition (Push-Pull)
  - Design and responding to market request
- Advantages
  - Close to emerging market trends
  - Network grounded on trust and proven relations
  - Reputation of technical creativity and process expertise
Paradigm innovation

- Prolonged impact of a growing product or positional innovation, unearthing ‘true’ value added rather than strategic Damascus road- R&D outcome not determinant!

  - Emergent consequence of ‘technology shadow options’ as opposed to strategic intent to develop new capabilities
  - Success based on experimentation, trail and error/adaption
  - Reinforces that alternative learning mode to R&D intensive STI mode

Learning by doing
Learning by using
Learning by interaction
How it’s managed?

• Unstructured process compared with larger firms and guided by entrepreneurial opportunity recognition rather than defined strategy

• Underpinned by context of constant scarce resources and reciprocal leverage of external sources.

• Individual project rather than portfolio perspective

• Heavily exploitative focused in nature and tendency towards incrementalism

• Reinforces pressing market need at expense of potential future pivots

• Opportunity for increased team decision-making, structured project management routines and diversity of collaborations
Innovation capability

- Entrepreneurial leadership with strong market knowledge
- Deep process knowledge and equipment supplier linkages
- Rich market knowledge and culture of responsiveness\ creative trail and error within resource constrained context
- Enhanced design impacting product and packaging
- Leverage of reciprocity-based collaboration within social network but scope for enhanced breadth and depth
- Predisposition toward DUI learning mode underpins the heterogeneity of its resource configuration and ongoing ability to reconfigure, redirect, transform for innovation purpose
**Inputs**
- Raw materials suppliers
- Relatively low skilled workforce
- Strong tacit knowledge of process and existing customer base

**Transformation**
- Incremental innovation
- Product design
- Process innovation driving NPD
- Speculative market innovation

**Resources**
- Internal capability
- Specialist equipment suppliers
- Complementor network

**Entrepreneurial Leader**
- Agility to emerging strategic opportunity (at higher margin)
- Trial and error experimentation
- Resource constrained, necessity driven creative adaption

**Market Fulfilment**
- Tight margin products often tending towards commodity

- Extensive problem solving and DUI learning with heavy emphasis on process innovation
- Strong relationship capability within narrow scope
- Creative adaption of equipment
- Intensive user-producer interaction and knowledge sharing
Innovation strategies

- Heavily skewed towards emergent entrepreneurial strategy
- Approach of necessity driven collaboration and reiterative trial and error learning centred on the project
  - Move up value chain through technological integration
  - Move up value chain through enhanced design and shifting market
  - Entrepreneurial ‘borrowing with pride’ product development
  - Increased efficiency and quality through specialist equipment
  - Responsiveness to market query resulting in internationalisation or analogous industry
  - Entrepreneurial unearthing of ‘shadow-options within process equipment that drives product and positional innovation
  - Enhanced absorptive capacity through team training/hiring
Theory implications

• Categorisation:
  – Industry sectors not homogeneous (Knowledge intensive firm) and under-reporting of LMT innovation (Franscati R&D definition)

• Centrality of the entrepreneur in LMT innovative success
  – Upper echelon theory and entrepreneurship process

• Opportunity driven strategic development
  – Lack of explorative focus linked to emergent strategy/ sustainability

• Process innovation management
  – Selection criteria, exaptation and ‘driver of NPD and paradigm’

• OI leveraged for necessity rather than strategic purpose and default is to rely on internal capabilities

• Learning mode of DUI rather than STI
  – Alternative capability development to R&D dominant perspective
Advancing LMT SME

• Innovation under reporting needs increased attention
  – Broader definition of what constitutes as R&D/innovation expenditure.

• Innovation centrality of entrepreneur/GM within LMT SME
  – Increases importance of management skills development

• Initiatives to enhance process technologies in firm, building out the firm’s capabilities.
  – Reinforces sustainability and allows frugal entrepreneurial mind-set discover shadow options

• Initiatives to widen management team’s international network
  – Tradeshows & Sales: Opportunity recognition and diversification/learning

• Initiatives to deepen collaborative capability maturity of the firm
  – Move from transactional to relational and from exploitative to exploratory focus through wider diversity of engagement (depth and breadth)

• Regional support networks (e.g. ProfitNET) to enhance resilience
  – Organic growth rather than systematic structuring
  – Role model of MHT rather than HT SME.
Suggestions and Comments
Useful texts
Management/Organizational

New Knowledge

Open Innovation

Invention Factories

Empathetic Design

Customers

Lead Users

Suppliers to the new BMW 3 series

Automotive News Europe

Management/Organizational

You've helped us pay $8,774.41 to over 1,200 artists worldwide.

Meet Stu Byrd - Mr. Prvrt

Sony: Galaxy

Microphone - digital to analog converter

Lockheed Martin Skunk Works

 Suppliers to the new BMW 3 series

Automotive News Europe

What is a lego casco? Next to the future. Time machine.

New Innovation Project

Download a project

FREE LEGO COMBO TUBE

FREE LEGO COMBO TUBE

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Shifting focus

Adapted from Cunningham 2014

Cumulative value creation—
Last 10 years

Less than 2% of projects produce
More than 90% of value...

Value creation is often found elsewhere
Doblin ten innovation types

Many innovation efforts focus on product offering …
Vanhaverbeke OI model

- **Envisioning and articulation of the business model**
- **Strategic innovation / redirection**
  - What is the value proposition?
  - How to capture value?
- **Reiteration**
- **Entrepreneur’s central role in the network of innovation partners**
  - Orchestrator role
  - Conflict management
- **Need for external key resources and skills**
- **Developing and managing (a network of) innovation partners**