



# Evaluating operations sustainability: Jamaican manufacturing cases

D. Chevers, I. Minto-Coy, D. Parker, A. Loh, E. Gebennini, B. Rimini and L. Zeppetella

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# The Problem

- The emergence of globalization has negatively affected the once vibrant manufacturing sector in the Caribbean
- Many manufacturing firms in the Caribbean are currently unable to compete with cheaper imported manufactured products from developed countries (Economic Commission for Latin America and the Caribbean, 2002)
- This trend has resulted in a rapid decline in the contribution to gross domestic product (GDP) of the manufacturing sector in many Caribbean countries (Russell & Millar, 2014a)
- For example, Barbados manufacturing contribution to GDP declined from 12.5% to 6.2% in 2000 (Downes, 2004), with Jamaica experiencing similar decline (Roberts & Manufacturing Task Force, 2009)

# Importance of the Study

- Executives of manufacturing firms in the Caribbean are becoming more aware of the reality that effective sustainable manufacturing practices are emerging as a key means of achieving competitive advantage (Vinodh & Joy, 2012)
- Sustainability represents a balance among environment, social and economic capital for the wellbeing of the firm, the planet and future generations (Wills, 2009)

# Motivation

- It is believed that sustainable manufacturing can promote business performance and competitiveness
- However, there is little empirical research in this domain (Russell & Millar, 2014; Shokri et al., 2014)

# Purpose of the Study

- This study seeks to evaluate the institutionalization of the five sustainability domains among manufacturing firms in Jamaica. The 5 sustainability domains are:
  - Corporate capital
  - Economic capital
  - Societal capital
  - Human capital
  - Natural capital

# Definitions

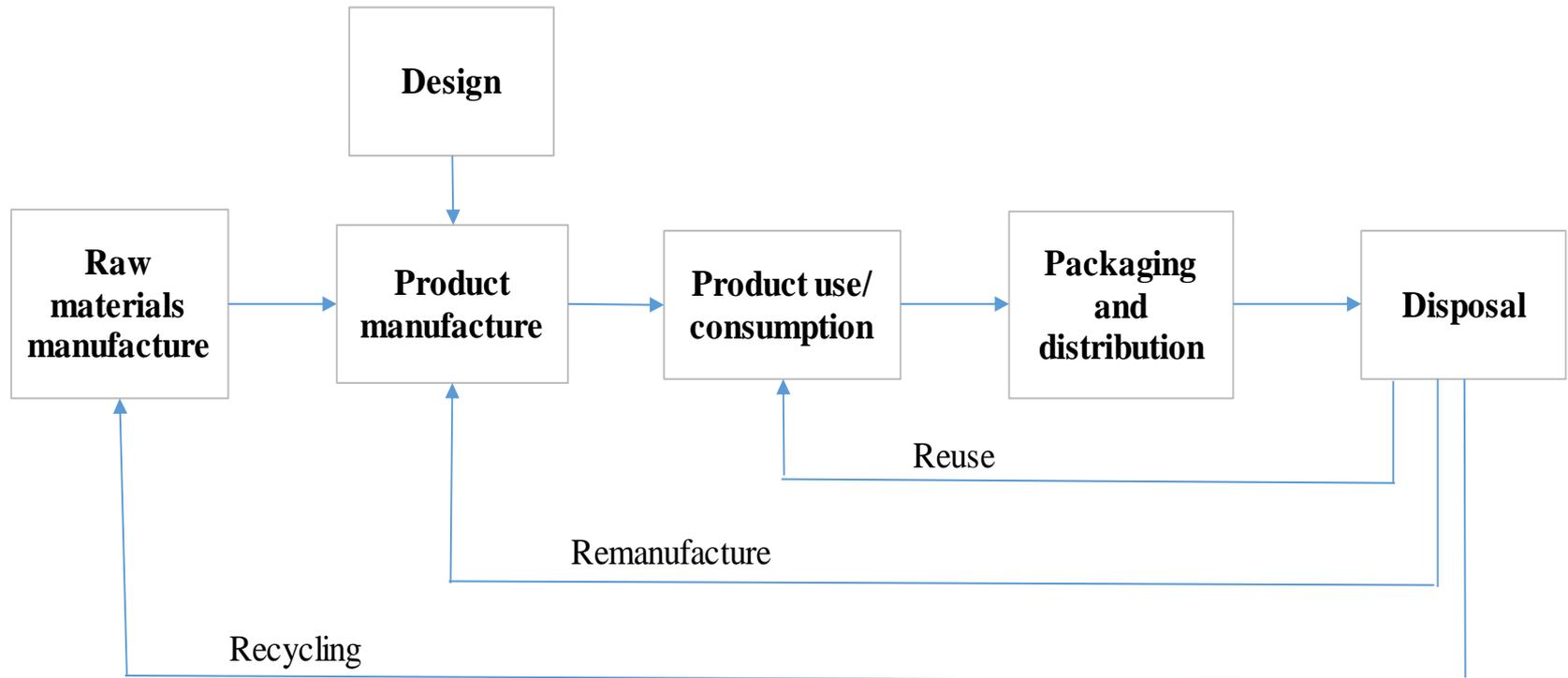
- Business sustainability is defined as “the increase in productivity and/or reduction of consumed resources without compromising product or service quality, competitiveness, or profitability while helping to save the environment” (Thomas, Francis, Elwyn, & Davies, 2011)
- Sustainable manufacturing is defined as the development of technologies to transform raw material inputs into products, without use of non-renewable materials, emission of greenhouse gasses or generation of waste (Russell & Allwood, 2005)

# Literature Review #1

- Manufacturing firms consume significant amounts of resources and generate huge amounts of waste (Millar & Russell, 2011) in which raw materials are converted to useful products but there is the need for disposal of waste (Gutowski et al., 2001)
- Manufacturing firms contribute 22% of European global warming potential (Mortensen, 2007)
- Many firms in developing countries, and more so those in the Caribbean have limited resources in finance, human and technology (Chevers, Mills, Duggan, & Moore, 2016) which can restrict their ability to overcome and properly manage waste disposal

# The Life-Cycle of Manufacturing

(Adapted from Gutowski et al., 2001)



# Jamaica's Manufacturing Sector

- The manufacturing sector represents an essential contributor to the economies of many developing countries including Jamaica (Roberts & Manufacturing Task Force, 2009)
- Jamaica's manufacturing sector is dominated by agro processing, beverages, tobacco, chemicals and petroleum products
- The manufacturing sector contributed \$55.9 billion to the Jamaican economy in 2015/2016 (Seaga, 2017)
- This makes the manufacturing sector the 2<sup>nd</sup> largest taxpayer in the country
- The sector contributed 8.6% to the country's gross domestic product (GDP) and employed about 6.8% of the population in 2012 (Durrant, 2017).

# Prior Studies #1

- Customers and the public are demanding that especially manufacturing firms minimize the negative impact of their products, processes and operations on the environment (Russell & Millar, 2014)
- Fewer than 50% of the participants in a survey within the Caribbean claimed to have strong awareness of sustainable manufacturing (Millar & Russell, 2011).
- In the same study conducted by (Millar & Russell, 2011) the primary reasons for not investing in sustainability were:
  - Lack of awareness of sustainability practices
  - Lack of opportunities to practice sustainability
  - Too expensive
  - No perceived commercial benefit
  - No legal obligation

# Prior Studies #2

- The main drivers for adopting sustainability practices in (Millar & Russell, 2011) study were:
  - Improve quality; Reduce waste; Improve efficiency
  - Increase market share; Creation of new markets
  - Differentiation (from competitors)
- In a survey conducted in the Caribbean among 60 manufacturing firms, it was found that cost and quality were the most strongly emphasized competitive priorities over flexibility, delivery and innovation (Russell & Millar, 2014)

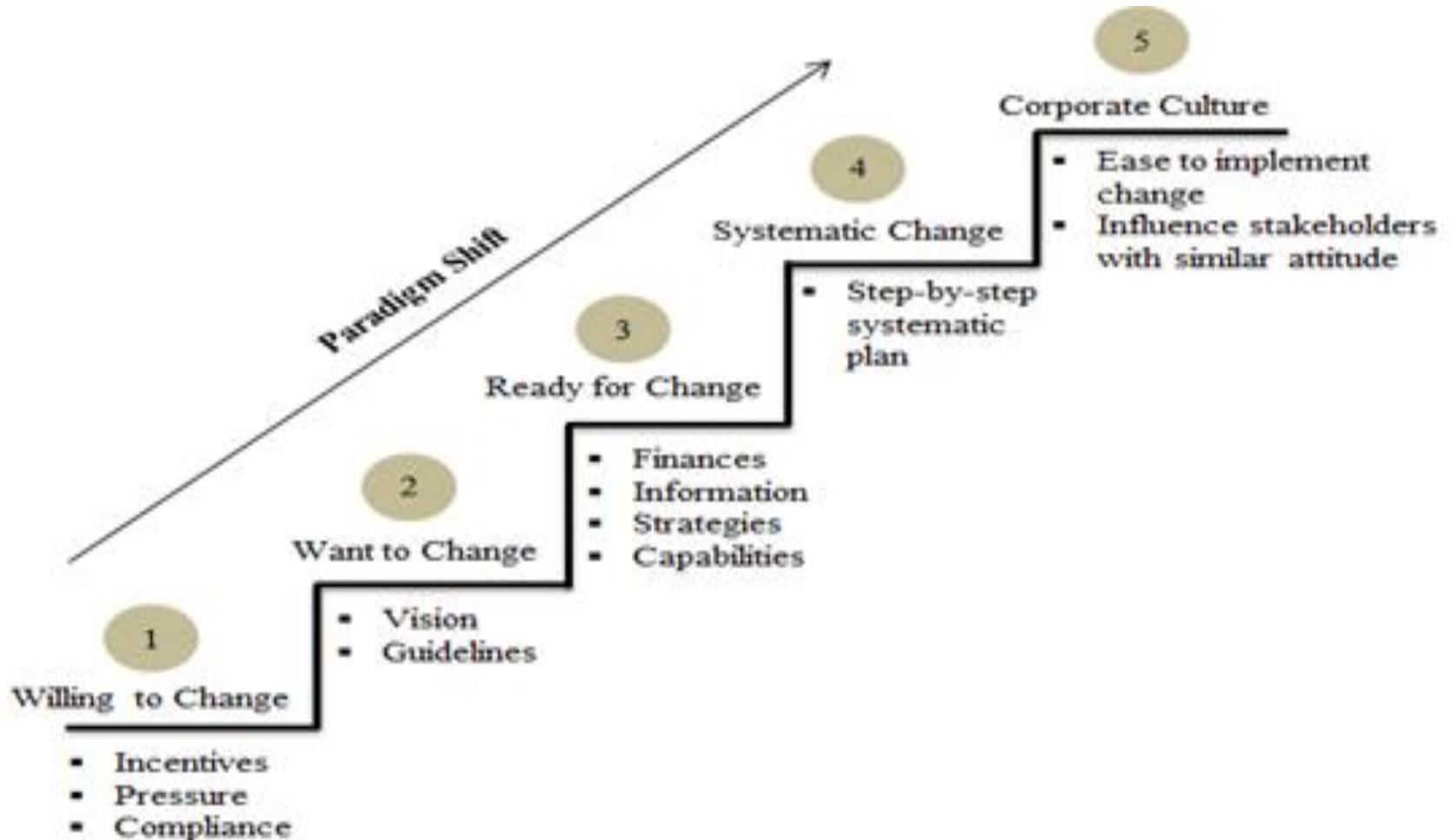
# Methodology

- The unit of analysis was the firm
- The survey was conducted in 3 manufacturing firms in Jamaica, using convenience sampling
- The participants were senior executives
- The survey instrument sought responses regarding demographic and sustainability data
- The demographic data related to the size of the firm and the sustainability data were a number of operating financial ratios

# Profile of Companies

| Company | Size of Company | Age of Company (years) | Operating Income (J\$000) | Net Margin (%) | Earnings Before Tax (%) | Return on Assets (%) | Return on Equity (%) |
|---------|-----------------|------------------------|---------------------------|----------------|-------------------------|----------------------|----------------------|
| JAM005  | Large           | 99                     | \$2,987,844               | 18%            | 23%                     | 22%                  | 24%                  |
| JAM006  | Medium          | 64                     | \$142,827                 | 6%             | 7%                      | 12%                  | 20%                  |
| JAM007  | Medium          | 21                     | \$1,000,000               | 7%             |                         |                      | 8%                   |

# 5-Point Evaluation Scale



# Tallying of the Sustainability Maturity Index

- The scores for each domain was tallied to computer the overall SMI
- Each domain had different number of interview questions
- For example, corporate capital had 34 questions, while economic capital had 19 questions
- Hence, the aggregated SMI for each domain could not be used to make comparison. Instead, the average was computed for each domain and this approach provided a better means to do the comparisons

# Findings

| ID #           | Total Corporate | Average Corporate | Rank | Total Economic | Average Economic | Rank | Total Societal | Average Societal | Rank |
|----------------|-----------------|-------------------|------|----------------|------------------|------|----------------|------------------|------|
| JAM005         | 161             | 4.74              | 1    | 94             | 4.95             | 1    | 58             | 4.83             | 1    |
| JAM006         | 135             | 3.97              | 3    | 77             | 4.05             | 3    | 41             | 3.42             | 3    |
| JAM007         | 141             | 4.15              | 2    | 81             | 4.26             | 2    | 51             | 4.25             | 2    |
| <b>Avg/Avg</b> |                 | <b>4.287</b>      |      |                | <b>4.420</b>     |      |                | <b>4.167</b>     |      |
| <b>Rank</b>    |                 | <b>3</b>          |      |                | <b>2</b>         |      |                | <b>4</b>         |      |

| ID #           | Total Human | Average Human | Rank | Total Natural | Average Natural | Rank | SMI Total  | Overall Rank |
|----------------|-------------|---------------|------|---------------|-----------------|------|------------|--------------|
| JAM005         | 106         | 4.82          | 1    | 40            | 5.00            | 1    | <b>459</b> | <b>1</b>     |
| JAM006         | 82          | 3.73          | 3    | 35            | 4.38            | 3    | <b>370</b> | <b>3</b>     |
| JAM007         | 87          | 3.95          | 2    | 37            | 4.63            | 2    | <b>397</b> | <b>2</b>     |
| <b>Avg/Avg</b> |             | <b>4.167</b>  |      |               | <b>4.670</b>    |      |            |              |
| <b>Rank</b>    |             | <b>4</b>      |      |               | <b>1</b>        |      |            |              |

# Findings

- The study confirms the notion that Caribbean manufacturing firms are committed to sustainability and sustainability practices are embedded and institutionalized in their operations
- Natural capital (commitment and concern for the environment) is the most dominant domain in Jamaican manufacturing firms, followed by economic and corporate capital
- The firm with the lowest operating income (JAM006) was ranked the lowest in terms of overall sustainability rank, with a SMI of 370
- The large firm with 340 employees was ranked as #1 and the medium firm with 60 employees was ranked as #2
- The oldest firm (JAM005) was ranked as number one in terms of SMI score

# Contribution of the Study

- It is hoped that the findings of the study can provide business executives with strategies to enhance sustainable manufacturing, which by extension can improve business performance and provide a competitive advantage

# Conclusion

- The study supports the claim that Caribbean manufacturing firms have adopted sustainable practices. However, further effort should be made to increase each sustainability domain to level 5 maturity
- Greater effort should be made to advance the maturity levels of societal and human capital, as these domains are somewhat lagging behind
- Caribbean manufacturing firms should strive for sustainable manufacturing, so that our present actions can increase the likelihood of future generations to survive and prosper

**Questions?**

**Thank You!**

# Definition of the 5 Sustainability Domains (Parker et al., 2016)

- **Corporate capital:**
  - Activities that demonstrate the inclusion of economic, social and environmental considerations in the normal business operations and in its interaction with stakeholders
- **Economic capital:**
  - Economic capital is an illustration of the organisation's efforts in instigating value-creating strategies, resource optimisation and creating value-adding activities
- **Societal capital:**
  - Societal capital is an accumulation of the corporation's public networks and social relations in the community in which it operates. It can be acquired through the corporation's efforts to address societal concerns and the maximising of social benefits to the community
- **Human capital:**
  - Human capital is an accumulation of knowledgeable, skilful, and competent individuals in the corporation. Human capital can be acquired through the corporation's efforts to encourage internal and external learning, and the building of internal loyalty
- **Natural capital:**
  - Natural capital of a corporation is an illustration of its conservation efforts aimed to reduce environmental impacts and initiation of responsible decision-making to promote or maintain the well-being of the planet