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A Method to Assess the Application of Additive Manufacturing to Inventory Replenishment

A thesis presented in partial fulfilment of the requirements for the

Master of Supply Chain Management

at Massey University, Albany, New Zealand

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Acronyms

3DP – Three-Dimensional Printing

AM – Additive Manufacturing

CAD – Computer Aided Design

CG1 – Complexity Group 1

COGS – Cost of Goods Sold

CSL – Cycle Service Level

DC – Distribution Centre

DDM – Direct Digital Manufacturing

EOQ – Economic Order Quantity

ERP – Enterprise Resource Planning

FOB – Free On Board

MOQ – Minimum Order Quantity

MRO – Maintenance, Repair and Operations

NZD – New Zealand Dollars

QRC – Quick Release Coupling

SCOR – Supply Chain Operation Reference

SKU – Stock Keeping Unit

TM – Traditional Manufacturing

VBA – Visual Basic for Applications

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Abstract

Companies have historically struggled to deal with their stock, especially the long inventory tail. As most of the inventory management techniques that deal with slow-moving stock have proved to be rather inefficient, this research investigates the use of additive manufacturing to 3D print items on demand and therefore mitigate the inventory carrying and associated costs. This research has been applied to a Hydraulic Equipment Business in New Zealand, which was tested through an inequation that models the traditional manufacturing and 3D printing costs, yielding the 'tipping point' for the use of the 3D printing technology. Even though the results obtained herein were negative for this particular case regarding the use of additive manufacturing, this research has developed a methodology to assess the trade-off between traditional manufacturing and 3D printing and also provides insights into the characteristics of the inventory of the businesses that are most likely to benefit from the use of the technology.

Keywords: additive manufacturing, 3D printing, inventory tail, slow-moving inventory.