Analyzing Christopher Ward's supply chain with digital twin technology for scalable growth

Degree programme: BSc in Industrial Engineering and Management Science
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Thesis advisor: Prof. Dr. Jörg Grimm
Expert: Prof. Dr. Bastian Widenmayer
Industrial partner: Christopher Ward SA, Biel/Bienne

Christopher Ward Switzerland's supply chain must scale from 15,000 to 65,000 watches annually while ensuring operational resilience. Digital twin modeling identifies key bottlenecks in production processes, supplier capacity, and lead times. The research primarily focuses on scaling production, with resilience-enhancing strategies, such as supplier diversification, dual sourcing, and inventory optimization, that mitigate risks along the way.

Mattia A. Talleri
076 249 18 28
mtalleri@hotmail.com

Introduction and objectives

Christopher Ward SA (CW), a British brand known for its Swiss-made timepieces and direct-to-consumer model, faces challenges as it aims to scale production from 15,000 to 65,000 watches annually by 2027. CW Switzerland, responsible for assembly, aims to improve scalability by enhancing visibility, reducing inefficiencies, and modernizing tools for growth. This thesis develops a digital twin of CW Switzerland's supply chain to enhance decision-making, provide predictive insights, and enable scenario simulation. It aims to create a scalable, adaptable supply chain that supports growth and long-term stability.

Research design

A systematic approach combining Bill of Materials (BOMs) analysis, supplier mapping, and simulation modeling addressed CW's supply chain scalability challenges. Focusing on CW's premium watch line (Bel Canto, Twelve X, C1 Moonphase, and C1 Moonglow), the study utilized data from Microsoft Dynamics to assess components, suppliers, and processes. Lucidchart mapping, using process flow analysis, identified inefficiencies, while collaboration with CW's supply chain managers resolved data gaps. Simio's discrete-event modeling enabled bottleneck identification and scalable solutions.

Results

The supply chain analysis of the Bel Canto series reveals a complex and highly interdependent network involving 24 suppliers across Switzerland, Hong Kong, China, and Taiwan. The production process is divided into four main stages: component production, finishing, parts assembly, and final assembly, requiring a total of 70 steps, 67 of which are outsourced. Components production involves 13 suppliers producing 76 components, of which 56 are unique. The finishing process consists of 9 suppliers handling 19 steps, while parts assembly is managed by 4 suppliers across 11 steps. Final assembly is streamlined, relying on 3 suppliers.
Procurement times vary widely, ranging from 1 to 32 weeks, with an average lead time of 7 weeks for an order of 300 pieces. Digital twin simulations showed that single-sourced components cause bottlenecks at high volumes, delaying assembly. Supplier limits hinder scaling to 65,000 units, while dual sourcing mitigates risks and boosts capacity.

Implications and recommendations

To mitigate bottlenecks, diversify suppliers, and implement dual sourcing, particularly in areas with long lead times. Strengthen contingency planning to address geopolitical risks. Additionally, integrating forecasting and inventory management can optimize procurement. Supplier capacity constraints should be considered to prevent delays.

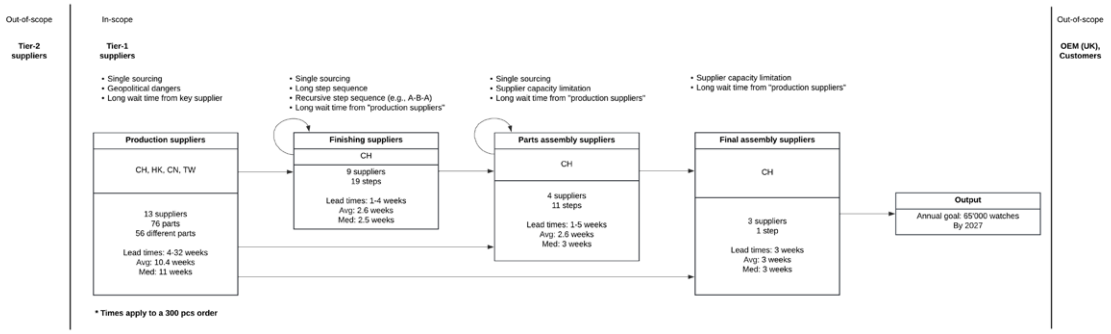

Figure 1: Schematic representation of the supply chain for the Bel Canto series of CW and current issues