Enhancing the resilience of pharmaceutical supply networks: the role of redistributed manufacturing

Study Aim

The aim of the feasibility study was to investigate the adoption of redistributed manufacturing (RDM) systems in pharmaceutical supply networks. We sought to answer the following questions: 1) "How can the adoption of redistributed manufacturing systems enhance the resilience of supply networks" and; 2) "Where can redistributed manufacturing add the most value in pharmaceutical supply networks?

Research Methods

The study took place over a six month period from October 1st, 2015 to March 31st, 2016. Data was gathered from ten case companies, five of which are global leaders in the pharmaceutical sector and five smaller U.K. firms. In addition to the case companies, expert opinion was gathered from leading industry experts and academics in the fields of innovation, additive manufacturing, life sciences and pharmaceuticals. We conducted a total of twenty-five semi-structured interviews and eight focus groups. The data was then objectively verified using primary and secondary documentation gathered from the case companies.

The researchers organized a knowledge exchange event at the University of Sussex on March 3rd, 2016. This event brought together industry and academic experts to map the future challenges facing the pharmaceutical industry and to identify where RDM can add the most value in pharmaceutical supply chains. Delegates came from a wide range of disciplines in both industry and academia. Industry participants included experts from the Association of British Pharmaceutical Industry (ABPI), Pfizer, GSK, TwoBC ltd. and Merck Serono. Academic experts came from the fields of life sciences, additive manufacturing, innovation and supply chain management at the Universities of Nottingham, Cambridge, the West of England, Loughborough and Sussex.

Key Findings

Barriers affecting the adoption of RDM

The main barrier affecting the adoption of RDM appears to be how the system is positioned with potential adopters. RDM is sold as a substitute manufacturing system that will disrupt the current centralized production system. The findings suggest that RDM should not be seen as a replacement, but instead as a system that can complement the centralized manufacturing system.

Another significant factor inhibiting the adoption of RDM is that the system is not perceived as addressing any current unmet needs of the pharmaceutical industry. Interviewees argued that to convince pharmaceutical firms to adopt RDM, a suitable drug or therapy should first be identified and subsequently developed and administered in a RDM context. Doing so would enable potential adopters to witness the benefits of an RDM system first hand.

How to convince the pharmaceutical industry to adopt RDM

Based on the findings from the feasibility study we recommend that RDM be viewed as a complementary manufacturing system that runs in parallel to the existing centralized manufacturing system. Centralized production facilities aggregate global demand volume to manufacture generic and small molecule drugs at a very low cost. Due to the sunk capital in existing infrastructure and the cost advantages of the centralized model it is difficult to make a

business case for RDM adoption. To convince pharmaceutical firms to adopt, we suggest RDM should not be positioned as a replacement but instead as a complementary manufacturing system.

Products that best fit the RDM system are personalized medicines such as gene therapies and compound products such as infusion bags that are targeted at small patient populations and uniquely tailored to patients. The manufacture of radioactive pharmaceuticals is another potentially viable option which, in effect, currently uses a RDM system. In the radio pharmacy model a hospital pharmacists prepares the radioactive injectable on-site allowing it to be administered to a patient in a matter of hours before it dissipates. The use of 3D printing would complement such a model as the product could be created on-site and administered immediately based on patient need. 3D printers could also be used for late-stage dispensing in hospital pharmacies because they allow for the production of personalized drug combinations.

The findings also suggest that the use of 3D printing within an RDM system could streamline the clinical trial process. Currently, pharmaceutical firms need to develop a manufacturing screen to get to stage three trials. Once the clinical trial process begins, the sponsor is tightly bound to the specific compound that is being tested. Changes to the compound or manufacturing process must be reported to regulators and could invalidate study results. Additive manufacturing's ability to produce a variety of compounds, within the confines of a defined manufacturing process, could permit more flexibility during drug development and validation.

Next Steps

The next step is working with industry to build a business case for the adoption of redistributed manufacturing as a complementary manufacturing system. The business case could include a value chain map of the production and distribution of one or two niche products within an RDM system. Future studies could also conduct a cost/benefit analysis of using the more flexible RDM system versus the cost advantages of the current centralized manufacturing model.

Research Team

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