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| **SUPPLY CHAIN MANAGEMENT** |
| Amcal & Sigma Pharmaceuticals |
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# 1.0 Brief Profile of Amcal under Sigma Pharmaceuticals:

Amcal Pharmacy is a leading chemist retailer in Australia since 1930s (PwC, 2020). It has grown up to be one of the most widely recognized pharmacies with its largest network of pharmacies in Australia. It has the aim of delivering customer focused healthcare to the community for improving health and wellbeing outcomes of the Australians. It is committed towards provision of its services based on value-for-money. Amcal offers broad range of consumer products including the non-prescription medicines, beauty products and lifestyle products in addition to the prescription medicines and OTC drugs (AmCal, 2020). However, in early 2011, it was acquired by Sigma Pharmaceuticals Limited which is a full-line wholesaler and retailer in Australia. Prior to 1997, it was considered to be Australia’s largest independent retail pharmacy group however it re-launched itself during past decade by rolling out new logo and pharmacy layout (Sigma Pharamceuticals, 2020). It is also selling medicines under its private label with over 230 products. Now it is operating under Sigma Pharmaceuticals Limited (Sigma Pharamceuticals, 2020).

# 2.0 Aim of Project:

The current report will be providing a detailed analysis of Amcal’s supply chain (as a part of Sigma Pharmaceuticals) and pinpoint some inefficiency within its logistics and supply chain. The report will also provide some recommendations to discard the inefficiencies and improve the overall agility and efficiency of the supply chain of Amcal. The aims of this report is to provide an insight of Amcal’s supply chain on basis of the physical flow of medicines, information flow and the management structure that controls the supply chain of Amcal.

# 3.0 Current Situation of Supply Chain:

In order to understand the supply chain of Amcal, it is important to get a grip of the streams of pharmacy practices in Australia. According to IBIS Report (2018), there are two streams of Pharmacy practice in Australia i.e. clinical (hospital) or community pharmacy. The community pharmacies are involved in provision of wide range of products and services most of which comprises of dispensing prescription medicines and pharmacy-only medicines i.e. over-the-counter drugs. In addition, the community pharmacies can also sell therapeutic substances including vitamins & minerals, beauty products, optical products, film development services and baby needs (IBIS Report, 2018). The current industry of pharmacy has three main product services in which largest pie is consumed by the prescription medicines. Most of the supply chains of pharmacies are under-utilized and inefficient due to being ill-equipped to cope up with different sort of medicines as till 2020 (IBIS Report, 2018).

The overall supply chain is the process through which the final product (medicine) travels after being manufactured to the final consumer (patient) for generating profits at the end (Moosivand, et al., 2019). It can include the organizational, operational and the other value-adding activities that are required to manufacture the medicines and get them to patients. For Amcal, the supply chain covers everything from development through delivery to patient. The overall supply chain of the Pharmaceutical sector in Australia is shown below (Sweeny, 2007):



**Figure 1: Pharmaceutical Supply Chain in Australia**

Source: Sweeny (2007)

The ultimate supply chain of the medicine is being dominated by the research based multinational pharmaceutical companies that are involved in domestic manufacturing, distribution and wholesaling (Hamilton, 2006). Significant part of the whole supply chain is sourced overseas in which multinational and Australian manufacturers participate by exporting pharmaceutical products with transformation (Sweeny, 2007). The overall Australia research community has developed links with the multinational companies while most of the research is done in Australia as clinical trials. After the drug has passed the tests and gets approved my health ministry, it flows to wholesalers/distributers from where it flows to pharmacists, other retailers and hospitals to be finally consumed by patients/consumers (Sweeny, 2007). In this whole supply chain, Amcal is the middle player that deals with upstream players i.e. wholesalers/distributors, manufacturers and research & development sectors. Its downstream players include patients and medical professionals. Since Amcal was acquired by Sigma Pharmaceuticals, so the company is considered to be vertically diversified (AmCal, 2020). The supply chain of Amcal is given in figure 2 below.



**Figure 2: Current Supply Chain of Amcal**

## 3.1 Key Players in the Current Supply Chain

Traditionally, Sigma Pharmaceuticals is one of the key supplier and wholesale distributor of drugs in Australia. Prior to 2010, it was a generic drug manufacturer as well but it considered to dispose of its manufacturing units and is now operating as the full-line distributor and wholesaler of medicine supplies in Australia (Sigma Pharamceuticals, 2020). It has over 15 distribution centers, 4000 pharmacies and 15000 product lines that can be delivered via road, sea and air to the customers (Sigma Pharamceuticals, 2020). It sources the medicines and drugs from over 450 suppliers and then stocks them up in 102,000 warehouses within Australia (Sigma Pharamceuticals, 2020). From there, Sigma Pharmaceutical moves the medicines to its Amcal Pharmacies and other retailers i.e. Chemist King, Discount Drug Stores, Guardian and Pharma Save (Sigma Pharamceuticals, 2020). It has also entered into strategic alliance with Pharmacy Alliance, Reform and Smarter Pharm for offering solutions to suit the pharmacies. Through this initiative, Sigma Pharmaceutical is supporting the retailers by giving them buying deals so that they can drive better health facilities for community (Sigma Pharamceuticals, 2020).

# 4.0 Key Issues in Current Supply Chain

The pharmaceutical supply chain is considered to business-to-business supply chain in which interoperability and flexible communication strategy play an important role. For the efficient performance of supply chain, the exchange of useful information amongst different players is considered to be a vital ingredient (Singh, et al., 2016). Moreover, the complexity of the supply chain of Sigma Pharmaceuticals requires the company to impose accountability for ensuring delivery of right drug, at the right time and place and in the right condition to the consumers who are in need of drugs. Logistics play a main role in the whole supply chain system of the company as the requirement of cold chain management is emerging (Kapoor, et al., 2019). The issues with current supply chain related to logistics are:

## 4.1 Absence of Cold Chain Management & Reverse Logistics

The cold chain involves the transportation of medicines that require minimum temperature for storage (Dr Rodrigue & Dr Notteboom, 2020). Throughout the current supply chain, the absence of cold chain management means that the company is overlooking the risks to its entire logistics of medicine supply throughout the nation. The associated risks with inefficient cold chain management include issues during transport, issues during warehouse storage and inefficient infrastructure (Ting, 2013). Currently, Amcal is not practicing the cold chain logistics due to which many temperature control medicines can get expired before even reaching out to customers. The reliance on cold chain has gained much importance in pharmaceutical industry where the testing, production and movement of drugs has to be made in controlled and uncompromised transfer of shipments. Although 80% of cold chain logistics requirement arise during the development and research phase, yet many of them are temperature sensitive even after the development phase is passed (Bishara, 2016). According to Dr. Rodrigue and Dr Notteboom (2020), about 10% of the medical drugs are considered to be temperature sensitive and require to be prevented from unanticipated exposure to variant temperature levels so that the risk of becoming ineffective and harmful to patients can be minimized.

The overall trend of deploying cold chain logistics relies on real-time intelligence applications for monitoring temperature controlled shipments, carrier performance, infrared thermometers, wired digital thermometers, temperature data loggers, passive loggers and wireless temperature loggers like RFID (Hassan, et al., 2016). Although the company’s logistic management includes the compatibility with USP 1079, ISTA 3D, 7D and 7E, but it still fails to manage the temperature, lane qualification measurement and pharma space measurement.

One common observation in the current supply chain is that the current system is inefficient for managing the risk of advanced therapy distribution (Bishara, 2016). Without the passive data management devices and IT services, Amcal is unable to support data management practices including lack of chain of custody and chain of condition. It is being emphasized worldwide that the cold chain logistics management in Pharmaceutical retailers and distributors is very important for preserving the overall efficacy of valuable cold chain (Ting, 2013).

Currently the global competitor of Amcal and Sigma Pharmaceutical named as Pfizer Australia is currently using cold logistics in partnership with DHL Australia for delivering its prescriptions to more than 5000 pharmacies across Australia since 2016. By partnering up with DHL, Pfizer has expanded its distribution points from two to seven and also improved the efficiency of its inventory management through logistics including temperature management, quality maintenance and insurance of products against breakage and adulteration (Post & Parcel, 2016).

## 4.2 Lack of Coordination and Information Sharing through IT

The tough challenges to logistics of Sigma Pharmaceuticals lie in lack of logistics coordination. Often the supply chain issue can skim due to differences in processes or systems. As Sigma Pharmaceutical has to supply the medicines and drugs to various retailers including Amcal, the difference in the requirements and demand of some branches can be tough without keeping the track. The importance of having a coordinated and flexible supply chain cannot be undermined in today’s economy (Azghandi, et al., 2018). Due to lack of coordination and traceability issues in supply chain can cause significant build up or shortage of inventory in the warehouses. This is sometimes known as bullwhip effect (Moosivand, et al., 2019).

The bullwhip effect can be caused due to misinformation amongst different players of the supply chain that can propagate up the supply chain. Long lead times can amplify this fact leading to high targeted inventory and long lead times (Altevogt, et al., 2014). The lack of demand information sharing amongst the supply chain member can also exaggerate the actual demand signals to manufacturers. It can be seen that without implementing coordination system like mobile technology or IT systems, the information distortion can result leading to total pipeline inventory clogging for more than 100 days. According to Moosivand et al. (2019), an estimated 10 days of pipeline inventory in pharmaceutical companies can lead to loss of as high as one percent of profit. It can also be said that with more complex chain structures, more demand information can get skewed to each chain member due to which supply chain members will face issues in updating demand information leading to lack of coordinated communication leading to bullwhip effect (Kalra, et al., 2012).

Sigma Pharmaceutical’s competitors like Pfizer utilize Oracle SCM Cloud for supply chain planning. Such database management systems allows pharmacies to combine demand management, sales & operations planning and distribution planning together for facilitating coordination amongst key players within the supply chain. Camelot Demand Driven LEAN Planning Suite is also being used by Pfizer for calculating possible future market demands based on adequate information that is obtained from other supply chain components (Oracle , 2020). According to Naraishman & Nair (2005), establishment of IT for making visibility and facilitating information sharing amongst supply chain entities is critical for having an effective supply chain. Ghatari et al. (2013) also pointed out that IT is most important factor for improving coordination in supply chain. Using IT for improving information sharing can enhance the supply chain performance and reduce the risk of bullwhip effect that can increase over-stocking or cause shortage of some drugs just like saline got short after Hurricane Maria in Puerto Rico in 2017 (US Food & Drug Administration, 2018).

# 5.0 Recommendations

In order to address both cold chain logistics and information sharing amongst supply chain members, following two recommendations have been made;

## 5.1 Outsourcing to DHL for Cold Chain Logistics

According to Chase et al. (2012) outsourcing the logistics activities to specialists can lead to cost savings, efficient logistics system and improved production. Since Sigma Pharmaceutical Industry is a wholesaler/distributor so it can look towards establishing key ties with DHL for taking benefit of improved production and sourcing efficiencies as DHL is a specialized third party logistic supplier (3PL) in Australia. Graf & Mudambi (2005) also pointed out that outsourcing the logistics to third part can allow firms to cut costs as well as to focus on core competencies that can speed up the innovation process in pharmaceutical industry.

By outsourcing to DHL, Sigma Pharamceutical can reduce its logistics cost by 30% of as calculated by World Bank (Graf & Mudambi, 2005). Since Australia is a hot continent, there is a strong need of maintaining certain temperatures during transportation and warehousing of medicines. DHL has a strong logistics chain in which it has air conditioned vehicles and trailers in which monitors are installed for feeding temperature back to central point (DHL, 2020). With this cost-effective approach, the company has also developed a direct flow model in which use of the transport hubs is minimized. DHL provides direct delivery from temperature controlled warehouses into the air-conditioned trailers to its final destination. It adheres to strict global standard of drugs in trucks with temperature below 180 C (DHL, 2020). Hence, partnering up with DHL will reduce cost of implementing cold chain and installing temperature control technology for supplying the medicines and drugs in Amcal and other retail brands under Sigma Pharmaceutical.

## 5.2 Implementation of RFID & Bokode

Cloud computing has emerged to provide an information platform in which the data can be secured and shared economically with suppliers and distributors around the world. The sudden changes in supply and demand of certain drugs can be accessed rapidly and responded to in short times by using this information (Kalra, et al., 2012). Amcal & Sigma Pharmaceuticals can use “Bokode” for keeping track of its inventory supplies and demand. Bokode is a data tag that can hold various information data points than a conventional barcode.

Similarly, the RFID can be used by Sigma Pharamceuticals for minimizing the bullwhip risk so that costs related to supply-demand imbalances can be mitigated (Kalra, et al., 2012). RFID system has proven its worth in FMCG sector and can be utilized for keeping a track of information regarding medicines demand and their supply. It can accurately reflect on real time information of sales that can be used for predicting demand of certain drugs in near future. In order to use RFID in supply chain, Sigma Pharmaceuticals can install RFID tags to the medicines that can be read for understanding the sales (Kalra, et al., 2012). The tags can transmit the signals to reader that can be transformed into meaningful information and be synchronized with internal information systems. The RFID technology needs to be integrated with the ERP and POS system of Amcal so that the information can be shared and monitored at each stage of distribution and sale. A relevant web-based system must also be supplemented for suppliers of Sigma Pharmaceutica;s so that they can track inventory levels, delivery status and retail sales data through web-portal (Kalra, et al., 2012). This can make the information flow throughout the supply chain without difficulties and can eliminate the risk of bullwhip effect in logistics supply chain of Sigma Pharmaceuticals and Amcal.

# 6.0 Conclusion

The above analysis indicates the issues with upper supply chain and logistics of Amcal (working under Sigma Pharmaceuticals). The identified issues with cold chain logistics management and lack of information technology application within supply chain can be minimized by using the proposed recommendations i.e. outsourcing to DHL and installation of RFID tags on medicines for reducing bullwhip effect. It is deemed that by doing so, Sigma Pharmaceuticals will be able to strengthen its supply chain logistics and Amcal will be able to perform better than its competitors in Australia i.e. Symbion Health, Pfizer, Australian Pharmaceutical Industries and Mayne Pharma. By doing so, Sigma can improve its current market share of 28% to be ahead of Symbion’s market share of 34%.

# 7.0 References

Altevogt, B. M., Wizemann, T. & Posey, S., 2014. *Improving Access to Essential Medicines for Mental, Neurological, and Substance Use Disorders in Sub-Saharan Africa: Workshop Summary..* s.l.:National Academies Press.

AmCal, 2020. *About Us: AmCal.* [Online]
Available at: https://www.amcal.com.au/corporate-info
[Accessed 18 April 2020].

Azghandi, R., Griffin, J. & Jalali, M., 2018. Minimization of Drug Shortages in Pharmaceutical Supply Chains: A Simulation-Based Analysis of Drug Recall Patterns and Inventory Policies. *Public Policy Modeling and Applications,* 3(10), pp. 2-19.

Bishara, R. H., 2016. Cold chain management–an essential component of the global pharmaceutical supply chain. *American Pharmaceutical Review ,* 9(1), pp. 105-109.

Chase, R. B., Jacobs, F. R. & Aquilano, N. J., 2012. *Operations management for competitive advantage.* Boston: Mc-Graw Hill.

DHL, 2020. *Helping Pharamaceuticals Keep Their Cool.* [Online]
Available at: https://www.dhl.com/au-en/home/our-divisions/supply-chain/thought-leadership/articles/life-sciences-and-healthcare/helping-pharmaceuticals-keep-their-cool.html
[Accessed 19 April 2020].

Dr Rodrigue, J.-P. & Dr Notteboom, T., 2020. The Cold Chain and its Logistics. *The Geography of Transport Systems,* 1(2), pp. 2-39.

Ghatari, A. R., Mehralian, G., Zarenezhad, F. & Rasekh, H. R., 2013. Developing a model for agile supply: An empirical study from Iranian pharmaceutical supply chain. *Iranian journal of pharmaceutical research: IJPR,* 12(1), p. 193.

Graf, M. & Mudambi, S. M., 2005. The outsourcing of IT-enabled business processes: A conceptual model of the location decision. *Journal of International management,* 11(2), pp. 253-268.

Hamilton, J., 2006. Business–customer alignment in the Australian pharmaceutical industry. *International journal of electronic business,* 4(5), pp. 401-420.

Hassan, T. et al., 2016. Re-organizing the pharmaceutical supply chain downstream: implementation a new pharmacy. *IFAC Proceedings ,* 39(3), pp. 727-732.

IBIS Report, 2018. *IBISWorld Industry Report G525a Pharmacies in Australia.* [Online]
Available at: https://www.guildevents.com.au/presentations/G525A%20Pharmacies%20in%20Australia%20industry%20report.pdf
[Accessed 18 April 2020].

Kalra, R., Shetty, P., Mutalik, S. & Nayak, U. Y., 2012. Pharmaceutical applications of radio-frequency identification. *Systematic Reviews in Pharmacy,* 3(1), p. 24.

Kapoor, D., Vyas, R. B. & Dadarwal, D., 2019. An Overview on Pharmaceutical Supply Chain: A Next Step towards Good Manufacturing Practice. *Drug Designing and Intellectual Property International Journal,* 1(2).

Moosivand, A., Ghatari, A. R. & Rasekh, H. R., 2019. Supply Chain Challenges in Pharmaceutical Manufacturing Companies: Using Qualitative System Dynamics Methodology. *Iranian Journal of Pharmaceutical Research,* 18(2), pp. 1103-1116.

Narasimhan, R. & Nair, A., 2005. The antecedent role of quality, information sharing and supply chain proximity on strategic alliance formation and performance. *International Journal of Production Economics ,* 96(3), pp. 301-313.

Oracle , 2020. *Unites Lean and CPM.* [Online]
Available at: https://www.oracle.com/applications/primavera/solutions/lean-scheduling/
[Accessed 18 April 2020].

Post & Parcel, 2016. *DHL Supply Chain Extends Partnership With Pfizer Australia.* [Online]
Available at: https://postandparcel.info/36322/news/dhl-supply-chain-extends-partnership-with-pfizer-australia/
[Accessed 19 April 2020].

PwC, 2020. *Pharma 2020: Supplying the future Which path will you take?.* [Online]
Available at: https://www.pwc.com/gx/en/pharma-life-sciences/pdf/pharma-2020-supplying-the-future.pdf
[Accessed 19 April 2020].

Sigma Pharamceuticals, 2020. *Our Services.* [Online]
Available at: https://sigmahealthcare.com.au/our-services/
[Accessed 18 April 2020].

Singh, R. K., Kumar, R. & Kumar, P., 2016. Strategic issues in pharmaceutical supply chains: a review. *International Journal of Pharmaceutical and Healthcare Marketing ,* 10(3), pp. 234-257.

Sweeny, K., 2007. *The Pharmaceutical Industry in Australia.* [Online]
Available at: https://core.ac.uk/download/pdf/10834489.pdf
[Accessed 18 April 2020].

Ting, P.-H., 2013. An efficient and guaranteed cold-chain logistics for temperature-sensitive foods: applications of RFID and sensor networks. *International Journal of Information Engineering and Electronic Business ,* 5(6), pp. 1-5.