IVEY | Publishing

NUS National University of Singapore

W18195

SIKA: OPTIMIZING THE APAC EPOXY FLOORING SUPPLY CHAIN

It was 8:00 a.m. on July 4, 2017, and Dorothy Kwok, regional head of Operations and Supply Chain at Sika AG (Sika), had just squeezed into the elevator that would take her to her office on the 17th floor. Having a quick read of an email on her mobile phone, Kwok noted another quarter of significant capacity underutilization in the Asia Pacific (APAC) supply chain for one of Sika's epoxy flooring products. Stepping out of the elevator, she wondered, "Is it time to review our current decentralized supply chain model?"

SIKA

Sika was a Swiss specialty chemicals leader in the development and production of solutions for the building and automotive industries.[1] Its business activities straddled seven markets: concrete, waterproofing, refurbishment, roofing, flooring, sealing, and bonding.

Kaspar Winkler laid the cornerstone of the firm in 1910 with his invention of waterproofing agents for mortar. Sika's first breakthrough came with its contribution to the sealing of Swiss Federal Railways' 15-kilometre Gotthard Base Tunnel in 1918. An innovative type of waterproofing mortar designed to protect against water ingress allowed electric trains to use the tunnel. Following an early expansion in Europe in the 1920s, Sika established its first Asian subsidiary in Japan in 1932.

By 2017, Sika had expanded globally with national subsidiaries and more than 190 production plants in 100 countries. Its workforce of more than 17,000 employees generated annual sales of SFr5.75 billion[2] in 2016.[3] Its market capitalization was approximately SFr16 billion in November 2017.[4] The APAC region, where Sika had a presence in 19 countries, contributed 19 per cent to its turnover.

[1] Sika website, accessed December 1, 2017, https://www.sika.com/.
[2] SFr = CHF = Swiss franc; SFr1 = US$0.99721 on November 1, 2017.
[3] Sika, "Record Sales with Growth in All Regions," media release, January 10, 2017, accessed December 1, 2017, www.sika.com/en/group/Media/Mediareleases/2017/rekordumsatz-mit-wachstum-in-allen-regionen.html.
[4] "Sika AG (SIKS.S)," Reuters, accessed December 1, 2017, www.reuters.com/finance/stocks/overview/SIK.S.

FLOORING AND COATING PRODUCTS

Sika's flooring and coating solutions were based on synthetic resin and cementitious systems. They were used in different functional areas in buildings and facilities used by various industries such as manufacturing, food and beverage, pharma, warehousing, car park, commercial, and institutional (e.g., schools, hospitals, and sports complexes). Each of these markets had specific requirements for floors in terms of traffic and mechanical wear, chemical resistance, temperature, slip resistance, impact resistance, permeability to liquids, fire resistance, and rapid curing. Sika introduced the modular concept for epoxy systems in the early 1980s and followed this initiative with numerous other innovations. It was also the market pioneer in hybrid and self-levelling solutions.

In the APAC region, Sika operated more than 50 production facilities in 18 countries. The epoxy flooring solution, whose capacity underutilization was of concern to Kwok, was produced in six countries and sold in eight countries, mostly in China, India, and Indonesia. While its production in different countries was very similar, its formulation varied due to local climate (hot/cold) and colour preferences.

The epoxy flooring solution was sold mainly to construction projects via contract specifications. The time from Sika being awarded a project to it supplying the material could be between four and six weeks. As a result, the demand throughout each quarter was project-based and could fluctuate in volume and in product variations. To reduce net working capital and the risk of expiration of the product in stock, Sika produced the epoxy flooring solution on a make-to-order basis. In the past, Sika had lost projects due to too long a lead time. Since then, Sika had instituted a maximum lead time of 30 days in the epoxy flooring product supply chain.

CURRENT APAC EPOXY FLOORING SUPPLY CHAIN

To allow quick decision making in the eight APAC countries where it sold the epoxy flooring product, Sika operated in a decentralized organization model, (i.e., a model that enabled free choice of supply partners with no formal coordination through the Regional Operations and Supply Chain function.) Demand for epoxy flooring in these countries was satisfied by local production or through imports from neighbouring Sika plants when there was no local production.

Exhibit 1 illustrates the supply chain in the second quarter of 2017. Each of the six producing countries primarily supplied its local market, while the plant in Country 3, which had the highest quarterly production capacity (5,286 tons), also fulfilled the demand in Country 7 and Country 8, which had no Sika production plants. Under the "freedom of choice" model, the total supply chain cost, comprising fixed operating costs plus landed costs, was US$50,537,164.

THE WIN–WIN COFFEE BREAK

Kwok had been concerned about the efficiency of the APAC epoxy flooring product supply chain since 2016. Leaving supply chain decisions to the local units had resulted in significant capacity and price inefficiencies. She had noted, for instance, that for the second quarter of 2017, capacity utilization ranged from 53 per cent (Country 2) to 88 per cent (Country 6), with an average of 71 per cent across the six producing countries. She believed that having production concentrated in fewer countries could meet the demand in the eight markets at a lower total cost. Production plants that were not needed could readily be reassigned to other products for which capacity was lacking.

On July 5, 2017, Kwok was sharing a morning coffee break with her colleague Roger Nadal, who had just returned from the first residential segment of an executive MBA program. When she described her supply chain concern to Nadal, he could not believe his luck—Nadal was looking for a problem to work on for an "Analytics@Workplace" project that was required for the completion of his Business Analytics for Decision Makers course. If he was provided the pertinent data, Nadal believed he could optimize the supply chain and improve its cost efficiency.

On the same afternoon, Nadal received data pertaining to the current quarterly capacity and fixed operating cost for each of the six production plants; for example, 1,725 tons and US$1,380,000 in Country 1, and so on for the other countries. He was also provided matrices of landed costs (comprising production, transportation, and import tax costs) and lead times (for order processing and transportation) from the production plant to market; for example, US$4,900/ton and 18 days for shipments from Country 1 to Country 2, and so on (see Exhibits 2 and 3). Lead time was not an issue when a production plant supplied its local market, and in such cases the lead time was at most seven days. However, for overseas shipments, the lead time varied widely between 12 and 49 days. As Sika imposed a 30-day maximum lead time, a producing plant could therefore only serve some markets. For instance, the plant in Country 1 could service countries 1, 2, 3, 4, and 7, but not 5, 6, and 8 (see Exhibit 3).

Nadal quickly applied the knowledge gained in his analytics course to develop an optimization template for the epoxy flooring supply chain problem.

REPLY FROM HEADQUARTERS

Soon after Kwok forwarded Nadal's solution to the company's headquarters (HQ) in Baar, Switzerland, she received an urgent email:

> HQ loves the supply chain rationalization proposal. Ultimately, we want a ROBUST solution that can be implemented for the next few years. According to our collaborative forecast model, the demand for this epoxy flooring product will grow moderately in the near future. Also, the landed cost and lead time matrices are expected to remain stable due to long-term contracts with our strategic supply and transportation partners; i.e., they will not change much.
>
> In light of these, please forward us a ROBUST solution that (1) has at least 700 tons [of] spare capacity to accommodate future growth in demand and (2) can satisfy a shorter lead time, which we think will be required by more of our customers. Can we hear from you by tomorrow?

EXHIBIT 1: PRODUCTION IN SIKA'S APAC REGION SUPPLY CHAIN, QUARTER 2, 2017

Quarterly Production Parameters | **Supply Chain (in tons)**

Operating?	Capacity (in tons)	Fixed Operating Cost (US$)	Production/Market	Country1	Country2	Country3	Country4	Country5	Country6	Country7	Country8
1	1,725	$1,380,000	Country 1	1,120	–	–	–	–	–	–	–
1	800	$1,050,000	Country 2	–	425	–	–	–	–	–	–
1	5,286	$3,171,600	Country 3	–	–	3,225	–	–	–	247	180
1	483	$618,240	Country 4	–	–	–	292	–	–	–	–
1	1,050	$1,785,000	Country 5	–	–	–	–	684	–	–	–
1	2,334	$1,633,800	Country 6	–	–	–	–	–	2,065	–	–
			Demand (tons)	1,120	425	3,225	292	684	2,065	247	180

Note: APAC = Asia and Pacific
Source: Created by the authors using company information.

EXHIBIT 2: SIKA'S LANDED COST MATRIX (IN US$)

Landed Cost (= Production + Transport + Import Tax) per Ton

Production/Market	Country 1	Country 2	Country 3	Country 4	Country 5	Country 6	Country 7	Country 8
Country 1	$4,840	$4,900	$5,484	$5,501	$5,182	$5,050	$5,152	$5,172
Country 2	$5,250	$5,180	$5,838	$5,872	$5,415	$5,350	$5,509	$5,519
Country 3	$5,030	$5,508	$4,880	$5,626	$5,236	$5,080	$5,030	$5,314
Country 4	$5,020	$5,504	$5,594	$4,940	$5,198	$5,140	$5,020	$5,297
Country 5	$5,191	$5,708	$5,788	$5,830	$5,071	$5,311	$5,211	$5,425
Country 6	$5,423	$5,655	$5,775	$5,776	$5,463	$5,050	$5,170	$5,493

Source: Created by the authors using company information.

EXHIBIT 3: SIKA'S LEAD TIME MATRIX

Lead Time Matrix (Order Processing & Transportation) Days

Production/Market	Country 1	Country 2	Country 3	Country 4	Country 5	Country 6	Country 7	Country 8
Country 1	7	18	24	14	31	31	14	39
Country 2	12	7	15	12	25	20	12	25
Country 3	16	15	7	16	27	25	16	29
Country 4	18	20	27	7	31	21	21	33
Country 5	31	38	38	38	7	38	38	24
Country 6	36	40	33	32	44	7	40	49

Max Lead Time: 30

Source: Created by the authors using company information.