

# NSK's Collaborative Value Creation Process

## NSK's Business Activities and Corporate Collaborative Val

Each activity in the value chain shown in the collaborative value creation model strengthens NSK's business activities by effectively and efficiently utilizing various forms of capital and leveraging NSK's unique strengths. In this section, we showcase the key capital inputs into each activity, NSK's strengths, and the tasks that are being addressed with the aim of further deepening the value chain.



### R&D

Based on our Four Core Technologies plus One ▶ P. 48, which comprise tribology, materials, numerical simulation, and mechatronics plus manufacturing engineering technologies, NSK's R&D activities in fundamental research, advanced development, application development, and manufacturing engineering lead to the further development of existing technologies as well as the creation of new products, technologies, and businesses.

Key Capital	Utilization of Capital/Creation of NSK's Strengths	Tasks Being Addressed to Deepen the Value Chain
Human Technical staff	<ul style="list-style-type: none"> <li>Systematic education programs and unique educational institutions, including the NSK Institute of Technology (NIT), for training and enhancing technical staff Ref. Number of participants in NIT (FY2020) 518</li> <li>High ability to respond to technical issues based on the depth of technical human resources and the accumulation of technology based on knowledge and experience</li> </ul>	<ul style="list-style-type: none"> <li>Establishment and promotion of proactive R&amp;D themes for rapid technological changes (e.g., electrification, automation, IoT, environment)</li> <li>Training and retention of engineers to hand down and evolve the Four Core Technologies plus One</li> </ul>
Intellectual Four Core Technologies plus One, R&D centers	<ul style="list-style-type: none"> <li>Global structure and network for R&amp;D centers</li> </ul>	<ul style="list-style-type: none"> <li>Improvement of development and evaluation efficiency by utilization of digital twin technology</li> <li>Improvement of "plus One = manufacturing engineering" that emphasizes and optimizes quality from the development stage</li> <li>Development of technologies and products to help protect the global environment and contribute to help reduce CO<sub>2</sub> emissions ▶ PP. 21–23, 27</li> </ul>
Social/Relationship R&D structure with external parties	<ul style="list-style-type: none"> <li>System to quickly obtain product and technology needs and work on development based on close relationships with customers</li> <li>Reflection of feedback in product development through collaboration and joint development with customers, suppliers, external research institutes, and others (e.g., steel materials, grease, motors, and electronic control units [ECUs])</li> </ul>	<ul style="list-style-type: none"> <li>Further utilization of open innovation ▶ P. 49</li> </ul>
Financial Financial foundation for funding R&D Reference: R&D expenses on a managerial basis (FY2020) ¥28.6 billion	<ul style="list-style-type: none"> <li>Technology-related investment for growth (3%–4% of sales)</li> <li>Stable financial base</li> </ul>	<ul style="list-style-type: none"> <li>Sustainably achieve growth with profitability Pursuit of capital efficiency that exceeds the cost of capital (ROE of at least 10%) ▶ P. 40</li> </ul>



### Receipt of Orders

Having worked together to ascertain customer needs and social needs, the sales and technology divisions then make technical proposals and demonstrations that culminate in the receipt of orders. The timing of orders received, lead times, and other aspects of order-taking activities depend on the customer's business, products, and components used. For global products, the sales divisions coordinate with the relevant sites in other countries.

Key Capital	Utilization of Capital/Creation of NSK's Strengths	Tasks Being Addressed to Deepen the Value Chain
Manufacturing Experience and track record in QCDDSM	<ul style="list-style-type: none"> <li>NSK's global development and supply capabilities help to win a variety of orders (e.g., orders for newly developed, improved, and existing/standard products).</li> </ul>	<ul style="list-style-type: none"> <li>Proposals for supply from optimal locations that leverage global production sites ▶ P. 50</li> </ul>
Human Sales personnel	<ul style="list-style-type: none"> <li>Global Account Managers (GAMs) and Key Account Managers (KAMs) working together.</li> </ul>	<ul style="list-style-type: none"> <li>Based on changing customer and social needs, improvement in the level of proposal capabilities utilizing existing and newly developed technologies ▶ PP. 24–27, 35</li> <li>Maintaining relationships of trust and proposal/provision of value/services in new styles that go beyond conventional methods</li> </ul>
Intellectual Technical proposal capabilities	<ul style="list-style-type: none"> <li>NSK engineers and sales representatives communicate closely with customers, and internal systems support those communications.</li> </ul>	
Social/Relationship Strong relationships of trust with customers	<ul style="list-style-type: none"> <li>NSK focuses on high-quality, environmentally friendly products that are trusted by customers.</li> </ul>	
Social/Relationship NSK brand recognition		



### Mass Production Design/Preparation

Mass production design entails the design of large-lot products delivered to customers. Mass production includes both newly designed products and standardized products that do not require new designs. Mass production preparation involves the setting up of processes and production equipment at plants, once specifications have been finalized. In many cases, customer approval is required for product specifications, equipment, and processes.

Key Capital	Utilization of Capital/Creation of NSK's Strengths	Tasks Being Addressed to Deepen the Value Chain
Manufacturing Mass production equipment preparation, capital investment	<ul style="list-style-type: none"> <li>Lowering of mass production costs by NSK developing its own, specialized production equipment.</li> </ul>	<ul style="list-style-type: none"> <li>Utilization of core assets (capitalized differentiation technology) aimed at streamlining mass production design and reducing lead times</li> <li>Equipment and process settings to achieve stable mass production quality and reduced workload</li> </ul>
Financial		
Human Design engineers	<ul style="list-style-type: none"> <li>Having a framework in place to manage the entire process, from order receipt to the mass production launch, NSK performs detailed inspection and confirmation of specifications, quality, and cost at each process ▶ P. 39</li> </ul>	<ul style="list-style-type: none"> <li>Ascertainment of required quality level of markets (end users) and reflection in products ▶ P. 39</li> <li>Installation of mass production equipment that helps protect the global environment and contributes to help reduce CO<sub>2</sub> emissions ▶ P. 37</li> </ul>
Human NIT	<ul style="list-style-type: none"> <li>Design quality is a key factor in manufacturing quality. Accurately understanding the specifications required by customers and reflecting them in product design improves product development, design proposals, and project management.</li> </ul>	
Intellectual Accumulation of a wide variety of technologies R&D centers	<ul style="list-style-type: none"> <li>NSK carries out timely and cost-conscious preparations, from product design to mass production.</li> </ul>	<ul style="list-style-type: none"> <li>Improvement of development and evaluation efficiency by utilization of AI and simulation</li> </ul>

# Value Creation – Deepening of the Value Chain –



## Sales/Aftermarket to Feedback

Sales activities span the delivery of products to customers and distributors, inspection and acceptance of the delivered products, and final recording of the sale. Aftermarket services entail the maintenance and repair of equipment and machinery for customers and end users. Feedback from customers is reflected in production plan reviews, product improvements, and the development of new products.

Key Capital	Utilization of Capital/Creation of NSK's Strengths	Tasks Being Addressed to Deepen the Value Chain
Human Human resources to undertake sales, production, and inventory (SPI) management	<ul style="list-style-type: none"> <li>● NSK aims to maintain appropriate levels of inventory and undertakes strict inventory controls with advanced SPI management.</li> </ul>	<ul style="list-style-type: none"> <li>● Ongoing strengthening of efforts to reduce the environmental impact of logistics <a href="#">▶ P. 37</a></li> <li>● Building of a supply chain that can respond rapidly to demand fluctuations</li> </ul>
Intellectual Technical proposal and support capabilities for aftermarket customers Product-related survey and analytical data	<ul style="list-style-type: none"> <li>● Promotion of Asset Improvement Program (AIP) activities to provide added value to customers through products and technical services</li> <li>● Feedback is used to improve products and propose solutions with new technologies.</li> <li>● NSK advanced analysis capabilities and accumulated technologies from its access to a wide range of data fields, such as for defects and damage at customers and end users</li> </ul>	<ul style="list-style-type: none"> <li>● Further service improvements through AIP activity efforts, the accumulation of know-how, and global expansion</li> <li>● Design and development that leverages customer and market field data</li> </ul>
Social/Relationship Aftermarket service distribution channels (customers, distributors, and sales outlets)	<ul style="list-style-type: none"> <li>● NSK responds quickly and meticulously through its global sales network (112 locations).</li> <li>● NSK maintains strong relationships with its distributors and sales outlets as well as its extensive network.</li> <li>● In addition to responding to repair and maintenance demand for other companies' products, NSK leverages its advanced network to respond quickly to occasional demand outside of routine maintenance.</li> </ul>	<ul style="list-style-type: none"> <li>● Further improvement in customer satisfaction (strengthening of channel management, cultivating of specialists)</li> </ul>



## Manufacturing

The manufacture of products takes place at the NSK Group's manufacturing plants. A wide range of business collaborators, including in manufacturing, quality assurance, manufacturing engineering/equipment management, production control, plant accounting, and general affairs work, is necessary to ensure stringent management concerning quality, cost, and delivery (QCD). Both the Industrial Machinery Business and the Automotive Business maintain their own manufacturing plants.

Key Capital	Utilization of Capital/Creation of NSK's Strengths	Tasks Being Addressed to Deepen the Value Chain
Human Production technical skills	<ul style="list-style-type: none"> <li>● Excellent equipment development capabilities as well as on-site and maintenance capabilities to facilitate use of that equipment for many years</li> <li>● Promoting "Production Innovation (APS) activities" at each plant, continuously implementing improvement efforts in workplace processes</li> <li>● The NSK Manufacturing Education and Training Center provides hands-on training to engineers from plants around the world with the aim of passing down technical skills and improving technical capabilities.</li> </ul>	<ul style="list-style-type: none"> <li>● Training and retention of human resources to hand down and evolve <i>monozukuri</i>, creation of comfortable workplace</li> <li>● NSK's innovative <i>monozukuri</i> that combines on-site capabilities and digital technology</li> </ul>
Intellectual Various manufacturing engineering, accumulated know-how	<ul style="list-style-type: none"> <li>● As mother plants, some of the plants both in Japan and overseas have established support systems, such as for launching overseas plants and addressing measures for various tasks. <a href="#">▶ P. 51</a></li> <li>● Efforts for the building of smart factories and next-generation lines</li> <li>● Development of a facility management system and a smart system for facility maintenance (PM-Ai)</li> </ul>	<ul style="list-style-type: none"> <li>● Improvement of productivity using IoT (smart factory, expansion of next-generation line)</li> <li>● Introduction of mechanism for sharing production technology and know-how (PM-Ai) at each global plant</li> </ul>
Manufacturing Production plants and facilities	<ul style="list-style-type: none"> <li>● Operating 20 plants in Japan and 46 plants overseas; possesses a production system able to meet global demand in a timely manner</li> </ul>	<ul style="list-style-type: none"> <li>● Strengthening the effectiveness of BCP in production (strengthening building and equipment tolerance, improving complementary supply capacity)</li> </ul>
Natural Steel used as a raw material, components, oil, etc. Electrical power, water, etc., used in production activities	<ul style="list-style-type: none"> <li>● Development of manufacturing facilities and technologies that enhance energy and resource saving</li> </ul>	<ul style="list-style-type: none"> <li>● Shift to production facilities and production processes that help protect the global environment and contribute to help reduce CO<sub>2</sub> emissions. <a href="#">▶ PP. 23, 37</a></li> </ul>
Social/Relationship Suppliers and local communities	<ul style="list-style-type: none"> <li>● Continuing to maintain and strengthen good and strong relationships with suppliers and local communities</li> </ul>	

▶ For PM-Ai, please see NSK Report 2020 (P. 19). [https://www.nsk.com/investors/library/pdf/nsk\\_report/ir202003e.pdf](https://www.nsk.com/investors/library/pdf/nsk_report/ir202003e.pdf)



## Procurement

Based on the specifications determined by the development and design departments, activities to procure the raw materials/components used in products, production facilities, sub-materials, etc. The Company realizes high-level QCD and stable procurement through fair, impartial, transparent, and socially and environmentally friendly transactions with its suppliers.

Key Capital	Utilization of Capital/Creation of NSK's Strengths	Tasks Being Addressed to Deepen the Value Chain
Social/Relationship Relationships of trust and coordination with suppliers	<ul style="list-style-type: none"> <li>● Continuously maintaining and strengthening favorable and strong relationships with its suppliers</li> <li>● In the event of a natural disaster, has in place a system to quickly ascertain the damage status and supplier problems and take the necessary measures in cooperation with them</li> <li>● Promotes CSR activities throughout the supply chain toward the realization of a sustainable society</li> </ul>	<ul style="list-style-type: none"> <li>● Stable procurement (ensuring the flexibility of supply, strengthening the effectiveness of supply chain BCP)</li> <li>● Enhance level of CSR management throughout the supply chain <a href="#">▶ P. 38</a></li> </ul>
Intellectual Development purchasing	<ul style="list-style-type: none"> <li>● Achieves a high level of QCD through continuous improvement activities and joint development in collaboration with suppliers</li> <li>● A structure that enables in-house development and manufacturing as well as the procurement of facilities and equipment from within the Group</li> <li>● Strengthening its tolerance to foreign exchange rate fluctuations by expanding the localization of procurement</li> </ul>	<ul style="list-style-type: none"> <li>● Optimization of the supplier portfolio (through collaboration and competitive principles)</li> <li>● Reduce environmental impact throughout the value chain (appropriate management of environmentally hazardous substances, global warming countermeasures)</li> </ul>
Human Buyer skills	<ul style="list-style-type: none"> <li>● Encouragement of supplier BCP activities</li> </ul>	<ul style="list-style-type: none"> <li>● Strengthening effectiveness of supply chain BCP</li> </ul>