

## Abstract

The purpose of this quantitative study aims to benefit Stellantis manufacturing in the Indiana region. A comparison of World-Class Manufacturing (WCM) costs versus implementing the Stellantis Production Way (SPW) in the Indiana manufacturing plants has been completed. Stellantis' cost and productivity data worldwide and at the plant level are explored. J.D. Power quality ratings and Stellantis' annual reports were listed with the positive and negative effects of the new manufacturing system. Stellantis is transforming its current production system WCM, to a new system named SPW. This project quantifies the value this transformation provides to Stellantis U.S., LLC. SPW is a combination of Fiat Chrysler Automobiles (FCA) and Peugeot S.A. (PSA) manufacturing systems. Financially, the first full year results were exceptional, with €14 billion in net profit (Stellantis N.V., 2022-a). The recommended solution is to continue the implementation of SPW at Stellantis.

## Driving Research Question

From 2021 to 2023, Stellantis is transforming from its current production system, WCM, into a new system named SPW. SPW uses two managerial and ten technical domains to focus teams on key metrics. Stellantis seeks to improve its production system by combining former FCA and Peugeot S.A. manufacturing systems. The new manufacturing method was the target of this project. What quality and financial value did this transformation provide to Stellantis in North America, specifically the central Indiana region?

## Problem Statement

This research project assessed Stellantis' WCM value versus the newly created SPW. Stellantis' global competitors utilize WCM, a synthesis of continuous improvement programs. The WCM system provides a framework to improve manufacturing competitiveness through a structured approach to reducing or eliminating costs and losses and increasing quality.

The problem for Stellantis U.S., LLC is to realize the return on investment when implementing a new manufacturing system in its automotive operations. Stellantis plans to transform the current WCM system into SPW to create a competitive advantage in the manufacturing arena. The further investment could achieve the exact opposite of what the system was designed to accomplish (i.e., reducing or eliminating waste). The problem the research will answer is whether WCM is a more robust manufacturing system than SPW. The research addressed the lack of understanding of the SPW system.

## Method

- Quantitative study on the merits of the Stellantis Production Way
- Data researched utilizing Stellantis' internal key metrics and public quarterly financial statements
- Statistical analysis with students' t-test to compare means
- Focus on Stellantis' five manufacturing locations in Indiana

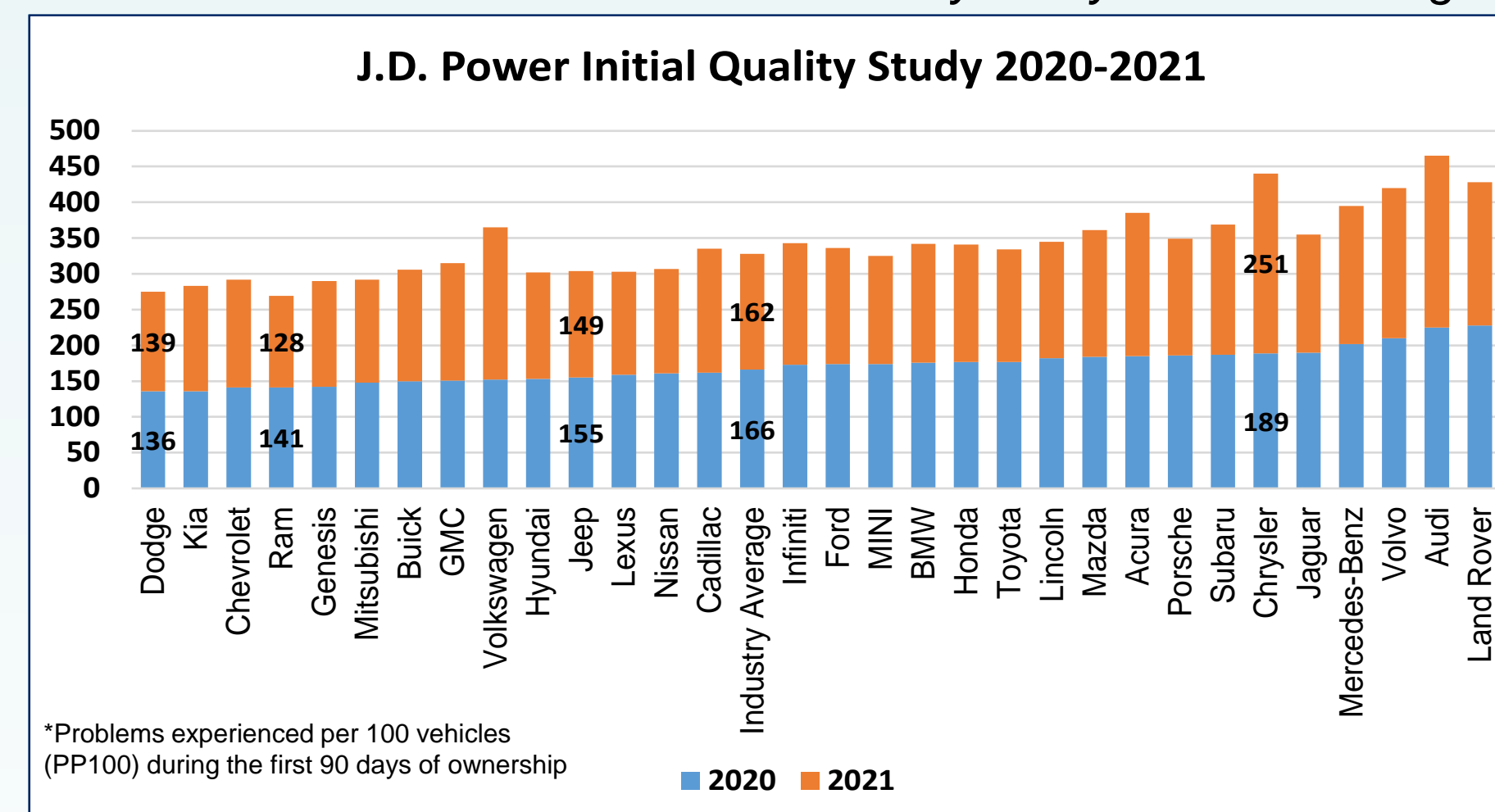
## Results

This project quantifies the value the SPW transformation provides to Stellantis U.S., LLC. Financially, the first full year results were exceptional, with 14 billion euros (€) in net profit (Stellantis N.V., 2022-a). The improved quality of the Stellantis products have been validated through third-party evaluation by J.D. Power. Stellantis has received initial quality awards for its vehicles. The initial quality survey (IQS) listed rankings by brand for 2020–2021 with Jeep decreasing from problems experienced per 100 vehicles (PP100) during the first 90 days of ownership from 155 to 149, and Ram from 141 to 128 (J.D. Power Awards 2020 & J.D. Power Awards 2021). The reduction in labor is small but not insignificant as each plant will utilize two fewer employees and multiplying that by five plants in central Indiana will yield 10 less positions needed.

## Results

This graph represents a third-party initial quality survey showing an overall increase in quality for Stellantis vehicles.

J.D. Power 2020 & 2021 U.S. Initial Quality Study-Brand Rankings

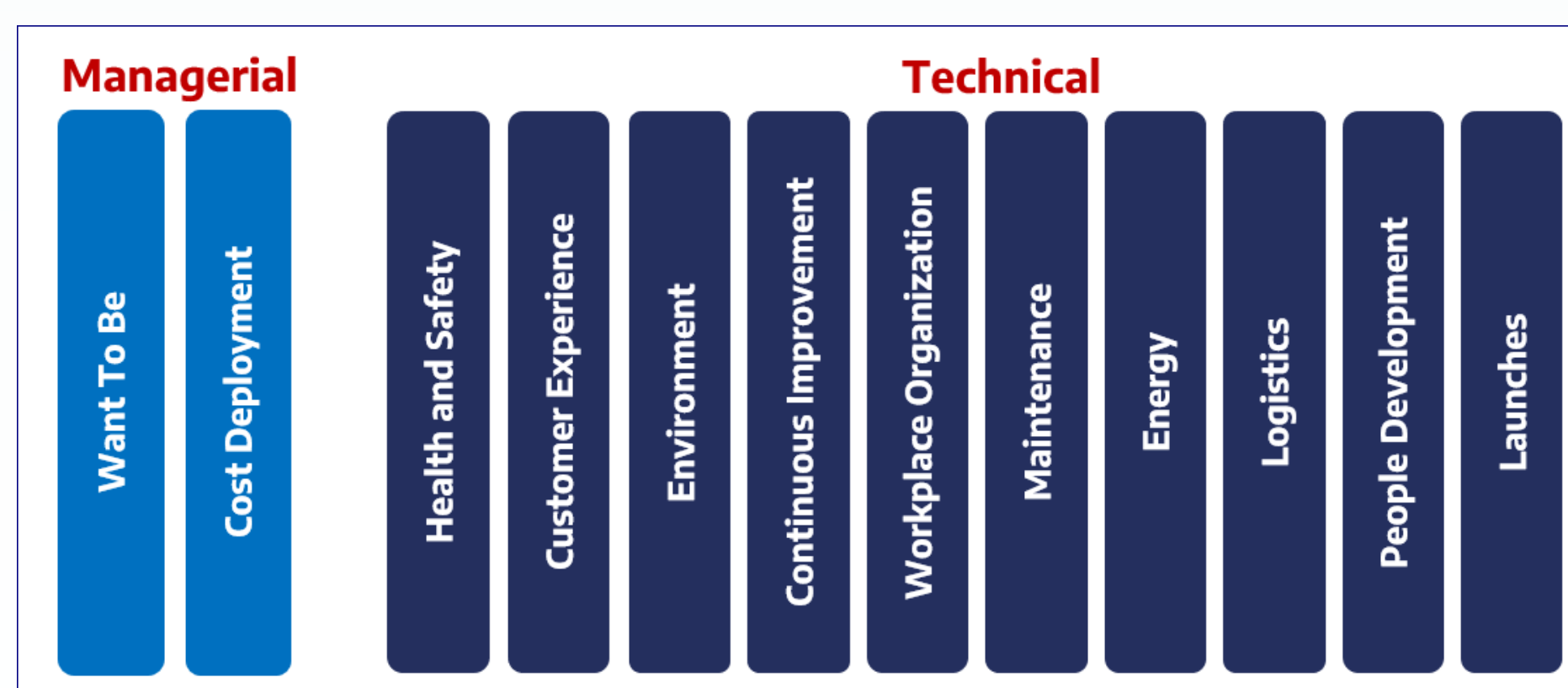


Note. Adapted from J.D. Power (n.d.-a, n.d.-b).

## Results

This illustration represents the SPW Managerial and Technical domains.

SPW Domains 2022



Note. Adapted from Stellantis Can Do presentation (2022).

## Results

This table displays the increase in brand ranking for Stellantis vehicles from 2020 to 2021.

J.D. Power 2020 & 2021 U.S. Initial Quality Study-Brand Rankings

	Model	2020 Rank	2021 Rank
Small SUV	Jeep Renegade	11	12
Small SUV	Jeep Compass	9	10
Compact SUV	Jeep Cherokee	5	10
Compact SUV	Jeep Wrangler	11	8
Mid-Size SUV	Jeep Grand Cherokee	4	3
Mid-Size Pickup	Jeep Gladiator	5	1
Upper Mid-Size SUV	Dodge Durango	2	5
Large Car	Dodge Charger	2	3
Large Light Duty Pickup	RAM 1500	5	2
Large Heavy Duty Pickup	RAM 2500	3	1
Minivan	Chrysler Pacifica	3	4

Note. Adapted from J.D. Power (n.d.-a, n.d.-b).

## Results

The Student's *t*-test results with the null hypothesis (H0) show that the true difference between this group's means is zero. The alternate hypothesis (Ha) is that the true difference is different from zero (Bevans, 2020). A *t*-test for the 2021 Jeep Grand Cherokee using J.D. Power initial quality data showed no significant difference in means compared to 2020 model year data at the 5% significance level. The same test was calculated for the Ram 1500 and 2500 pickup trucks for model years 2020 and 2021. There was no significant difference at the 5% level. The 2020 Jeep Gladiator improved its J.D. Power rankings compared to the 2021 model year from 155 to 149. The initial quality metrics were significant at the 10% level using an interval difference between means *t*-tests (J.D. Power, n.d.-a; J.D. Power Awards, n.d.-b).

## Results

This formula represents the Students' *t*-test comparing two means. It was used to compare quality data in this study.

Students' *t*-test formula

### Formula

$t$  = Student's *t*-test  
 $x_1$  = mean one  
 $x_2$  = mean two  
 $s$  = standard deviation  
 $n$  = variable set size

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{s^2(\frac{1}{n_1} + \frac{1}{n_2})}}$$

Note. Adapted from Bevans (2020).

## Conclusion

SPW improves the prior manufacturing system at FCA and PSA, now Stellantis. There is a reduction of labor to implement and manage the system. The reporting structure is streamlined as layers of management are removed. Quality has been improved as shown by a third-party survey. Net Profits were robust for the first year of the company. The key performance indicators will lead each domain to achieve the needed results in quality, delivery, and cost. By communicating information effectively and focusing on critical metrics, the company can meet its electrification goals and net-zero carbon content (Stellantis N.V., 2022-b).

## Future Research

- Compile Stellantis' 20-F financial statements for 2022 and 2023. Compare net revenue, net profit, and total liabilities.
- Research and compile data on the J.D. Power IQS for 2020, 2021, 2022, 2023, and 2024. Compare for improvements in problems experienced per 100 vehicles (PP100) during the first 90 days of ownership.

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