

MRIO Analysis of Manufacturing Services in North Rhine-Westphalia

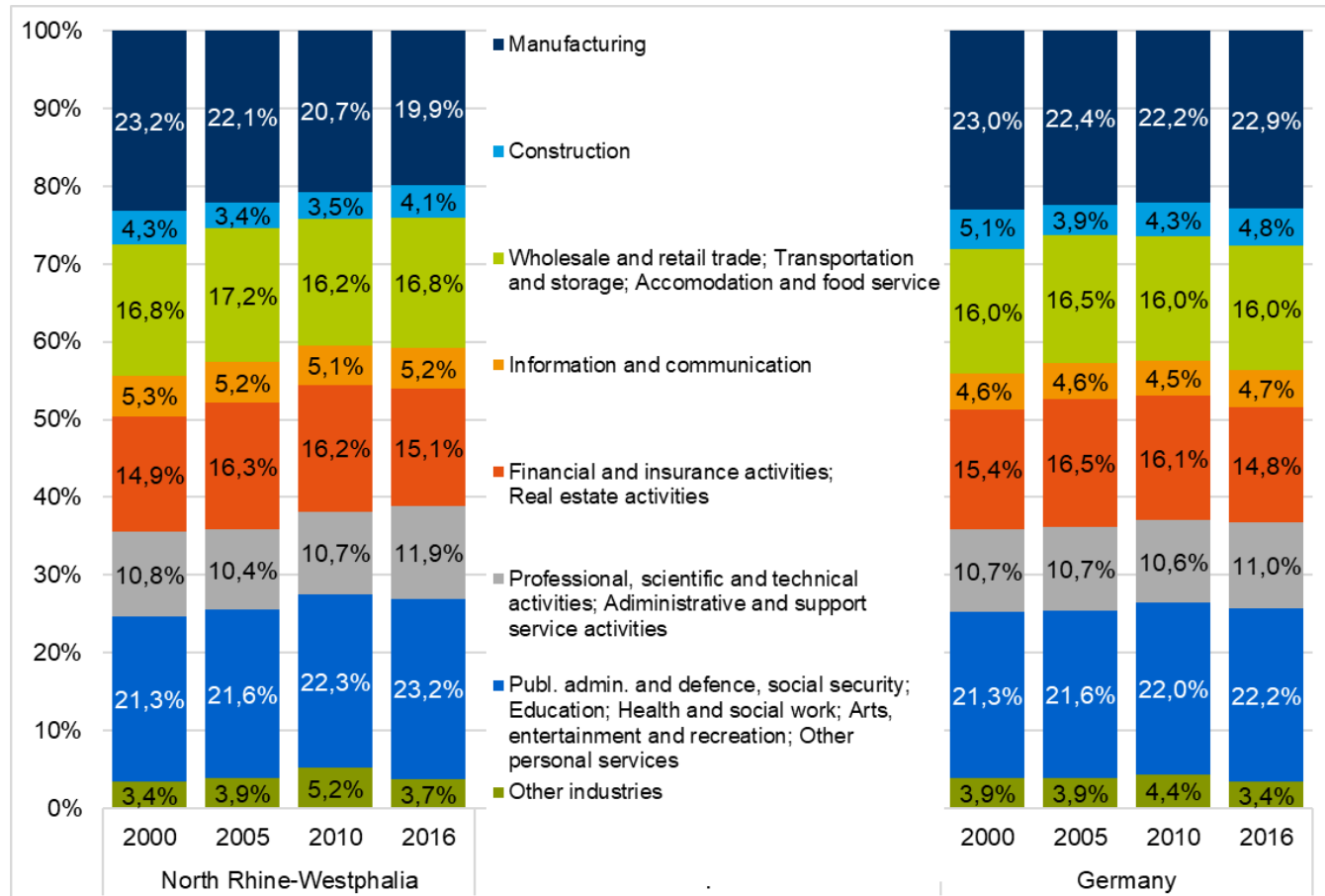
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Agenda

- Background
- Manufacturing services
- The MRIO model
- Findings
- Discussion
- Conclusion

Share of sectors in GVA, NRW and Germany, 2000-2016

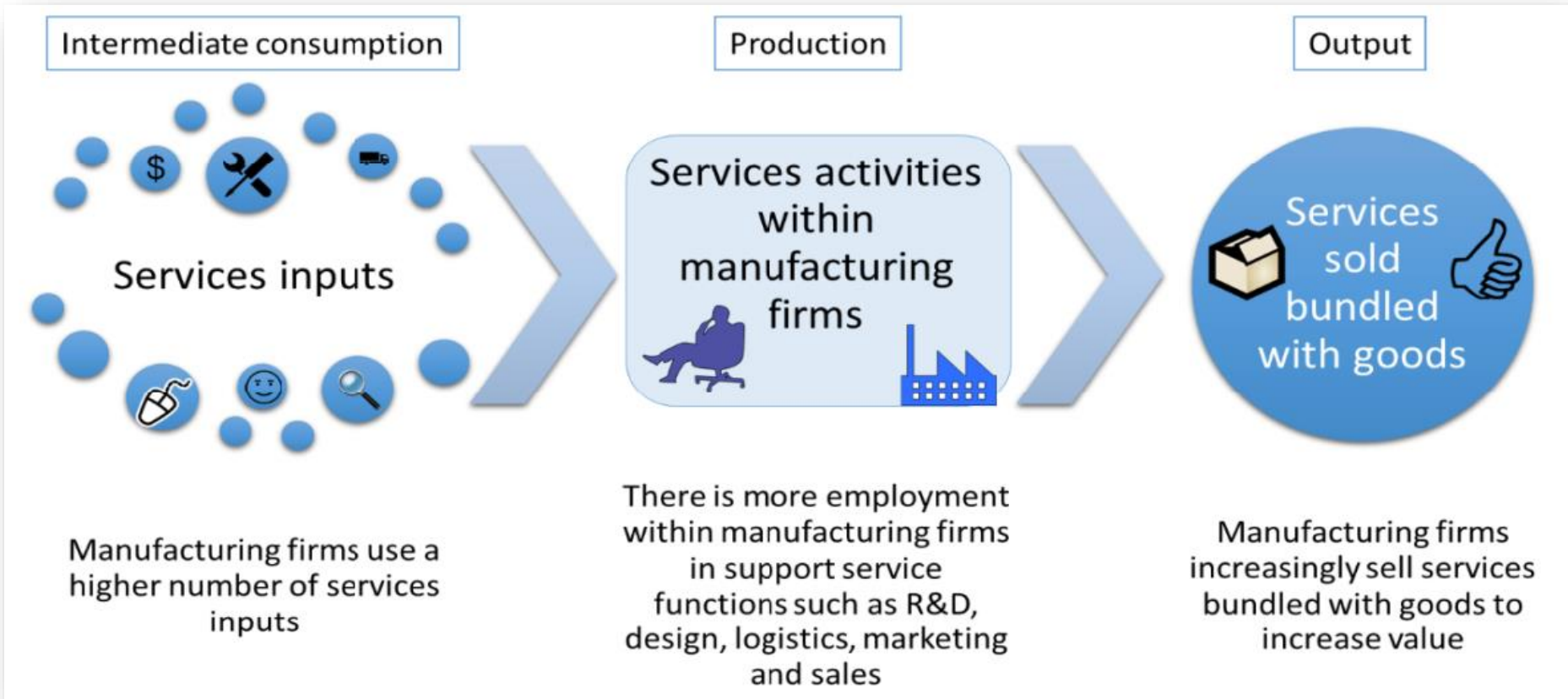


- NRW was traditionally considered a manufacturing region.
- Between 2000 and 2016, the share of manufacturing in total value added has declined from 23.2% to 19.9%.
- For Germany as a whole, that figure has remained relatively stable.
- Deindustrialization? Not in Germany as a whole, but perhaps in NRW!

Background

- NRW: traditionally a manufacturing region
 - Mining and basic metals very important
 - Small and manufacturing-oriented service sector
- Manufacturing is declining...
 - Share of manufacturing in value added is now lower than in Germany!
 - Hard coal mining is gone, lignite mining will disappear.
 - Steel industry under pressure (ThyssenKrupp)!
- What happens if “deindustrialization” continues?
 - Will services replace manufacturing?
 - Or will we lose services, too?

“Servicification” of Manufacturing



Source: Miroudot/Cadestin (OECD Trade Policy Papers No. 197), 2017, S. 8

Manufacturing Services

- Some service providers focus on final consumers (private households). Examples:
 - Theatres
 - Health care
 - Education
- **Business services** focus on other companies. Examples:
 - Accounting services
 - Advertising and market research services
 - Architectural and engineering services
- Among those, some services focus especially on companies in the manufacturing sector.
 - We call them “**manufacturing services**” (ManS).
 - They are the focus of our analysis.

Manufacturing Services

- Which branches can be classified as ManS?
- That depends on the structure of their customers:
 - Intermediate use vs. final use
 - Manufacturing vs. other branches
- To identify ManS branches, we just have to follow the rows of the input-output table (IOT).
- Problem: No official IOT for NRW
- Solution: Construct an IOT for NRW
- And while we're at it, let's make it a MRIOT.

The MRIO Model

- We use the MRIOT from the WIOD (44 regions, 56 branches).
- We divide Germany into two regions: NRW and rest of the country (ROC).
- We get a MRIOT with 45 regions and 56 branches.
- This MRIOT can be used to study the links between NRW's service branches and the manufacturing branches inside and outside NRW.
- Two important research questions:
 - Which branches can be classified as ManS?
 - To what extent are NRW's ManS dependent on NRW's manufacturing sector?

Findings

To identify ManS branches, we compute the **manufacturing share** for each branch:

$$\frac{\textit{intermediate use in manufacturing}}{\textit{intermediate use}}$$

Manufacturing Shares of NRW's Service Branches

Code	Title	Manufacturing share (%)
H49	Land transport and transport via pipelines	31,1
H50	Water transport	30,5
H51	Air transport	26,1
H52	Warehousing and support activities for transportation	18,5
H53	Postal and courier activities	23,9
I	Accommodation and food service activities	18,4
J58	Publishing activities	12,4
J59_J60	Motion picture, video and television programme production, sound recording and music publishing activities; programming and broadcasting activities	0,8
J61	Telecommunications	8,4
J62_J63	Computer programming, consultancy and related activities; information service activities	16,7
K64	Financial service activities, except insurance and pension funding	18,0
K65	Insurance, reinsurance and pension funding, except compulsory social security	14,3
K66	Activities auxiliary to financial services and insurance activities	0,3
L68	Real estate activities	16,0
M69_M70	Legal and accounting activities; activities of head offices; management consultancy activities	23,1
M71	Architectural and engineering activities; technical testing and analysis	35,2
M72	Scientific research and development	28,9
M73	Advertising and market research	51,7
M74_M75	Other professional, scientific and technical activities; veterinary activities	24,4
N	Administrative and support service activities	26,2
O84	Public administration and defence; compulsory social security	20,6
P85	Education	13,4
Q	Human health and social work activities	2,7
R_S	Other service activities	11,6

Source: MRIOT NRW, authors' calculations.

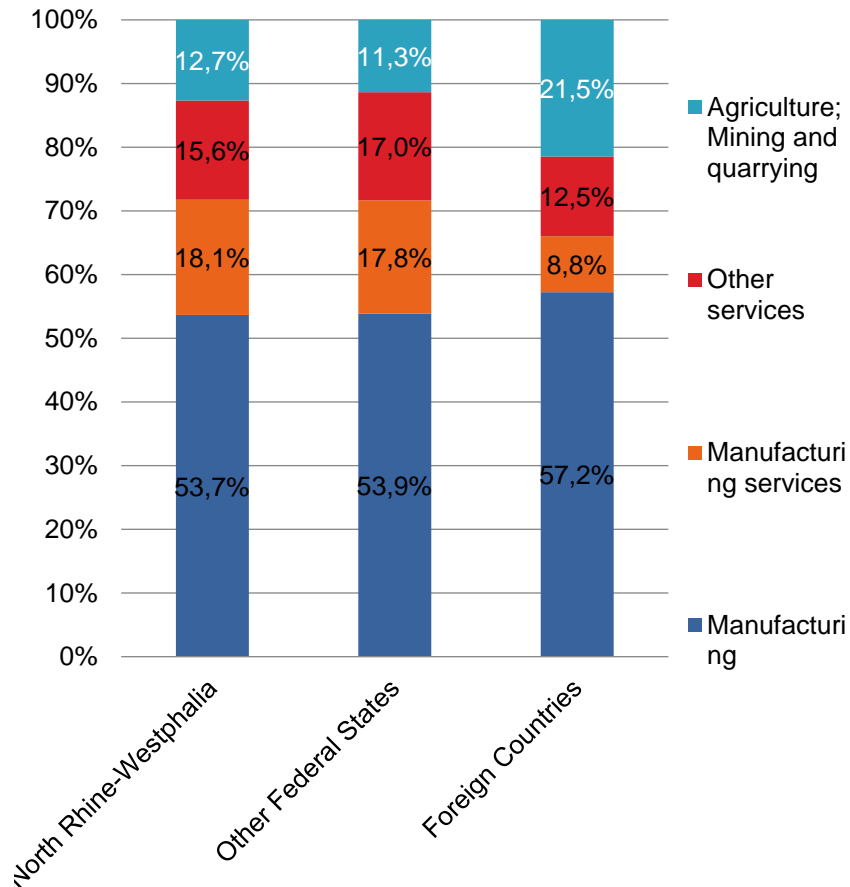
Industry-oriented Services

NACE Code	Short description
H49	Land transport and transport via pipelines
H50	Water transport
H51	Air transport
H52	Warehousing and support activities for transportation
H53	Postal and courier activities
J62_J63	Information and communication services
M69_M70	Legal and accounting activities; Activities of head offices; Management consultancy activities
M71	Architectural and engineering activities; technical testing and analysis
M72	Scientific research and development
M73	Advertising and market research
M74_M75	Other professional, scientific and technical activities
N	Administrative and support service activities

In “our” definition of ManS, we include:

- All service branches with a manufacturing share of >25%
- The “rest” of sectors H and M
- IT services (J62/63)

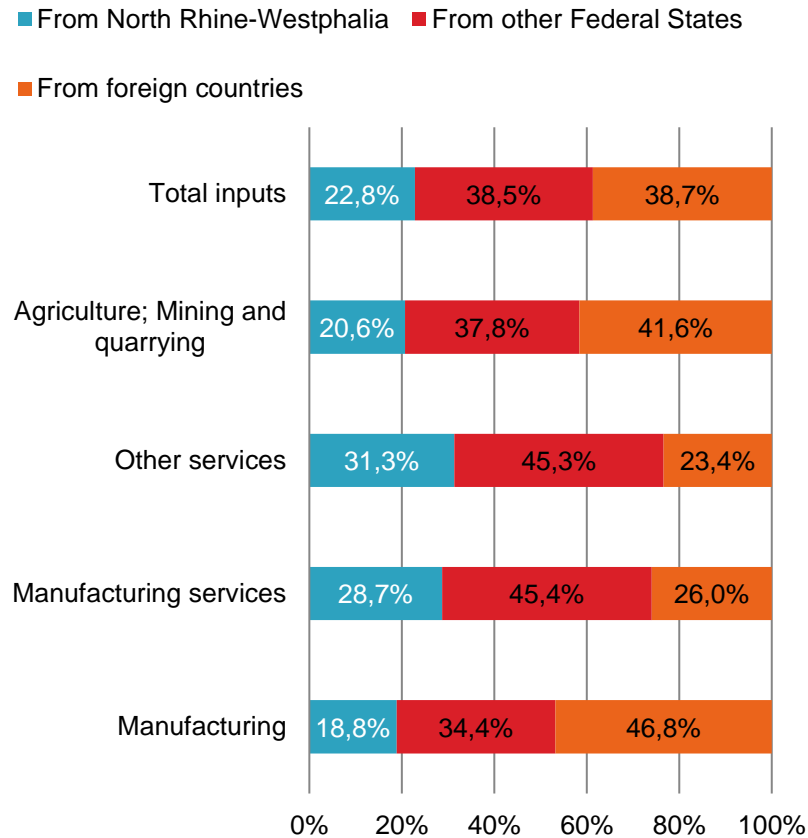
Input Structure of the Manufacturing Sector



Source: MRIOT NRW, authors' calculations.

- The input structure of the manufacturing sector in NRW is very similar to that in the rest of Germany.
- More than 50% of intermediate inputs come from the manufacturing sector itself.
- ManS account for ~18%.

Origin of Intermediate Inputs for NRW's Manufacturing Sector



Source: MRIOT NRW, authors' calculations.

- NRW's manufacturing sector receives most of its intermediate inputs from ROC (38.5%) and ROW (38.7%). Only 22.8% come from within NRW.
- For ManS, the share of regionally sourced inputs is somewhat higher (28.7%).
- Apparently NRW's manufacturing sector is not very dependent on regional suppliers.
- What about the "opposite" direction?

Destination of NRW's ManS output

	NRW	Rest of Country	Rest of World
H	32.3	60.7	7.0
J62/63	22.7	58.7	18.6
M	30.6	54.3	15.1
N	38.6	57.2	4.3

Source: MRIOT NRW, authors' calculations.

- The ManS branches of NRW deliver more than half of their output to ROC.
- The “dependence” of ManS branches on regional customers ranges from 22.7% (IT services) to 38.6% (administrative and support services).
- Apparently NRW's ManS branches are not very dependent on regional customers.

Dependence of Regional ManS on Regional Manufacturing

- To what extent does regional ManS depend on regional manufacturing?
- Within the I-O framework:
 - There is a certain (final) demand for manufacturing products from NRW.
 - To satisfy that demand, the regional manufacturing sector demands ManS (from NRW and other regions).
 - How much regional output (in the ManS branches) depends on the (final) demand for regional manufacturing products?
- To answer this question, we extract the final demand vector from the MRIOT and enter it into a simple demand-driven I-O model.

Final Demand for NRW's Manufacturing Products



		NRW	ROC	ROW	Total
C10-C12	Manufacture of food products, beverages and tobacco products	5.253	8.517	7.815	21.585
C13-C15	Manufacture of textiles, wearing apparel and leather products	78	128	1.412	1.618
C16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	516	985	26	1.526
C17	Manufacture of paper and paper products	394	694	364	1.452
C18	Printing and reproduction of recorded media	182	433	7	622
C19	Manufacture of coke and refined petroleum products	2.825	7.233	1.054	11.111
C20	Manufacture of chemicals and chemical products	989	2.048	3.104	6.141
C21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	816	875	2.504	4.195
C22	Manufacture of rubber and plastic products	409	725	1.011	2.145
C23	Manufacture of other non-metallic mineral products	575	689	187	1.451
C24	Manufacture of basic metals	366	1.280	228	1.874
C25	Manufacture of fabricated metal products, except machinery and equipment	1.530	3.718	1.911	7.159
C26	Manufacture of computer, electronic and optical products	353	686	2.238	3.277
C27	Manufacture of electrical equipment	783	1.209	3.322	5.314
C28	Manufacture of machinery and equipment n.e.c.	2.181	5.537	16.096	23.814
C29	Manufacture of motor vehicles, trailers and semi-trailers	1.991	5.070	10.919	17.980
C30	Manufacture of other transport equipment	243	407	1.080	1.730
C31_C32	Manufacture of furniture; other manufacturing	967	1.684	2.926	5.578
C33	Repair and installation of machinery and equipment	735	1.512	245	2.492
	Zusammen	21.184	43.432	56.447	121.064

Source: MRIOT NRW, authors' calculations.

These are the final demand vectors that go into our model.

Dependence of NRW's Manufacturing Branches on Final Demand

	GVA (MEUR)	Share dependent on final demand for...					
		IOS (direct)	Manu- facturing	of which:			Others branches
				NRW	ROC	ROW	
H49 Land transport	9.875	25,5%	31,0%	4,5%	17,2%	9,3%	55,7%
H50 Water transport	287	35,8%	21,8%	0,6%	2,5%	18,6%	46,9%
H51 Air transport	615	62,9%	12,8%	1,7%	5,5%	5,5%	28,7%
H52 Warehousing and support for transp.	10.243	4,1%	38,3%	4,8%	21,4%	12,1%	72,5%
H53 Postal and courier services	3.016	7,9%	29,5%	4,2%	17,4%	7,9%	74,5%
J62_J63 IT services	15.305	56,5%	12,6%	1,5%	7,4%	3,8%	40,0%
M69_M70 Management, consulting, accounting etc.	20.198	7,2%	32,0%	4,3%	17,6%	10,1%	71,8%
M71 Architectural and engineering services	7.178	36,2%	25,0%	2,9%	13,1%	9,0%	49,1%
M72 Scientific research and development	4.078	91,6%	3,7%	0,3%	1,4%	2,0%	9,5%
M73 Advertising and market research	2.744	2,0%	48,5%	8,7%	27,5%	12,4%	60,5%
M74_M75 Other professional services	2.506	31,7%	22,6%	3,3%	11,7%	7,7%	53,0%
N Administrative and support services	30.830	15,3%	31,2%	4,8%	18,1%	8,3%	65,9%
IOS total	106.875	22,1%	28,8%	4,0%	16,2%	8,6%	49,1%

Source: MRIOT NRW, authors' calculations.

Conclusion

- The results of our MRIO analysis suggest that NRW's ManS branches are not very dependent on regional manufacturing.
- In fact, they are more dependent on manufacturing in ROC and ROW than on regional manufacturing.
- Globalization: firms can make use of global supply chains.
 - They can re-locate production if they want to.
 - They can find customers and suppliers in other regions and countries
- Apparently this is also true for ManS.
- According to the textbooks, goods are tradable while services aren't.
- Wrong! ManS are tradable.

Conclusion

- How reliable are our findings?
- To be honest, the MRIO is based on a number of assumptions and estimations of unknown accuracy.
- Complementary research!
 - Survey of regional firms
 - Interviews with firms from manufacturing and IOS
- Findings confirm the results of the MRIO analysis.
- Companies (including ManS suppliers) report intensive links with ROC and ROW.