Summary Statistics of 29 Variables by Firm

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Introduction

This report details the active variables used for factor extraction. Variables with variance below 0.10 were excluded, as they do not contribute meaningful information to the results. This selection criterion ensures that the included variables provide significant insights into the underlying data structure and the constructs they represent (Access, Skills, and Usage).

Firms Size Using 3 Levels Measured by Revenue

year	size_rev	count	total	props	variance
2014	small	12711	18832	0.675	0.219375
2014	medium	3626	18832	0.193	0.155751
2014	large	2495	18832	0.132	0.114576
2015	small	12855	19322	0.665	0.222775
2015	medium	3724	19322	0.193	0.155751
2015	large	2743	19322	0.142	0.121836
2016	small	11563	18892	0.612	0.237456
2016	medium	4238	18892	0.224	0.173824
2016	large	3091	18892	0.164	0.137104
2017	small	13170	21195	0.621	0.235359
2017	medium	4710	21195	0.222	0.172716
2017	large	3315	21195	0.156	0.131664
2018	small	13671	21825	0.626	0.234124
2018	medium	4703	21825	0.215	0.168775
2018	large	3451	21825	0.158	0.133036
2019	small	10954	18383	0.596	0.240784
2019	medium	4152	18383	0.226	0.174924
2019	large	3277	18383	0.178	0.146316

Firms Size Using 2 Levels Measured by Revenue

year	sme_rev	count	total	props
2014	sme	16337	18832	0.868
2014	large	2495	18832	0.132
2015	sme	16579	19322	0.858
2015	large	2743	19322	0.142
2016	sme	15801	18892	0.836
2016	large	3091	18892	0.164
2017	sme	17880	21195	0.844
2017	large	3315	21195	0.156
2018	sme	18374	21825	0.842
2018	large	3451	21825	0.158
2019	sme	15106	18383	0.822
2019	large	3277	18383	0.178

Control Variables Used for Factor Extraction

In this study, firm size using 3 levels, measured by revenue, was included as an active variable in the factor analysis to control for its influence on other variables. This approach ensures that the extracted factors account for size-related variations, enhancing their interpretability and providing a comprehensive understanding of the data. Incorporating firm size allows for a more accurate and representative analysis of the underlying data structure.

Revenue variable for firm size classification

The table below, based on ISTAT survey's documentation, outlines the revenue thresholds used for classifying firms by annual turnover. This classification is crucial for analyzing digital technology adoption across different enterprise sizes, ensuring a standardized approach according to European Commission guidelines.

Revenue_label	Threshold
0	[0, 20000)
20000	[20000, 50000)
50000	[50000, 100000)
100000	[100000, 200000)
200000	[200000, 500000)
500000	[500000, 1000000)
1000000	[1000000, 2000000)
2000000	[2000000, 4000000)
4000000	[4000000, 5000000)
5000000	[5000000, 10000000)
10000000	[10000000, 20000000)
20000000	[20000000, 50000000)
50000000	[50000000, 200000000)
200000000	[200000000, + inf)

Firm size classification

The revenue variable is categorized into 11 thresholds. Firms are classified based on the Commission Recommendation of 6 May 2003:

1. **Small Enterprises**: Annual turnover not exceeding EUR 10 million.
2. **Medium Enterprises**: Annual turnover not exceeding EUR 50 million.
3. **Large Enterprises**: Annual turnover exceeding EUR 50 million.

These thresholds, as defined by the European Commission, ensure standardized firm size classification.

Variables

In total there are 29 variables use to extract the factors that represent each construct access, skills, and usage. Three control variables representing the firm size were included.

- For the access index 6 variables + 3 size variables (small, medium, large)
- For the skills index 9 variables + 3 size variables (small, medium, large)
- For the usage index 11 variables + 3 size variables (small, medium, large)

Variable Naming Conventions

The variables in this study are categorized to reflect different aspects of digital technology adoption:

- **A (Access)**: Includes 'A1' for incentives and 'A2' for physical access.
- **S (Skills)**: Measures digital skills within the enterprise, from ICT training and maintenance to advanced IT management.
- **U (Usage)**: Assesses the use of digital technologies in various operations:
  - **UM**: Management, including using ERP and CRM and human resources managemenet.
  - **UMK**: Marketing, focusing on digital marketing and sales.
  - **UC**: Commerce, tracking e-commerce and online transactions.

These conventions ensure clear identification and logical grouping of variables, facilitating streamlined analysis and interpretation.

ACCESS Variables I

The 'ACCESS' category includes six variables, split into continuous and binary types, organized into two subcategories that highlight different facets of digital access:

1. **Incentives for Access (A1)**:
   - This includes a single variable, "IT training courses for employees without specialist ICT skills," aimed at fostering digital adoption by equipping employees with necessary skills.
2. **Physical Access (A2)**:
   - With five variables, this group measures physical aspects of digital access like computer availability and internet connectivity, critical for operational effectiveness and digital engagement in a competitive market.

ACCESS variables II (Incentives)

- Var name: IT training courses for employees without specialist ICT skills.
- Type: binary
- Code: A1_B2b

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.1449	0.1239	0.3520	0.14	0.15
2015	19322	0.1675	0.1394	0.3735	0.16	0.17
2016	18892	0.1734	0.1433	0.3786	0.17	0.18
2017	21195	0.1806	0.1480	0.3847	0.18	0.19
2018	21825	0.2284	0.1762	0.4198	0.22	0.23
2019	18383	0.2683	0.1963	0.4431	0.26	0.27

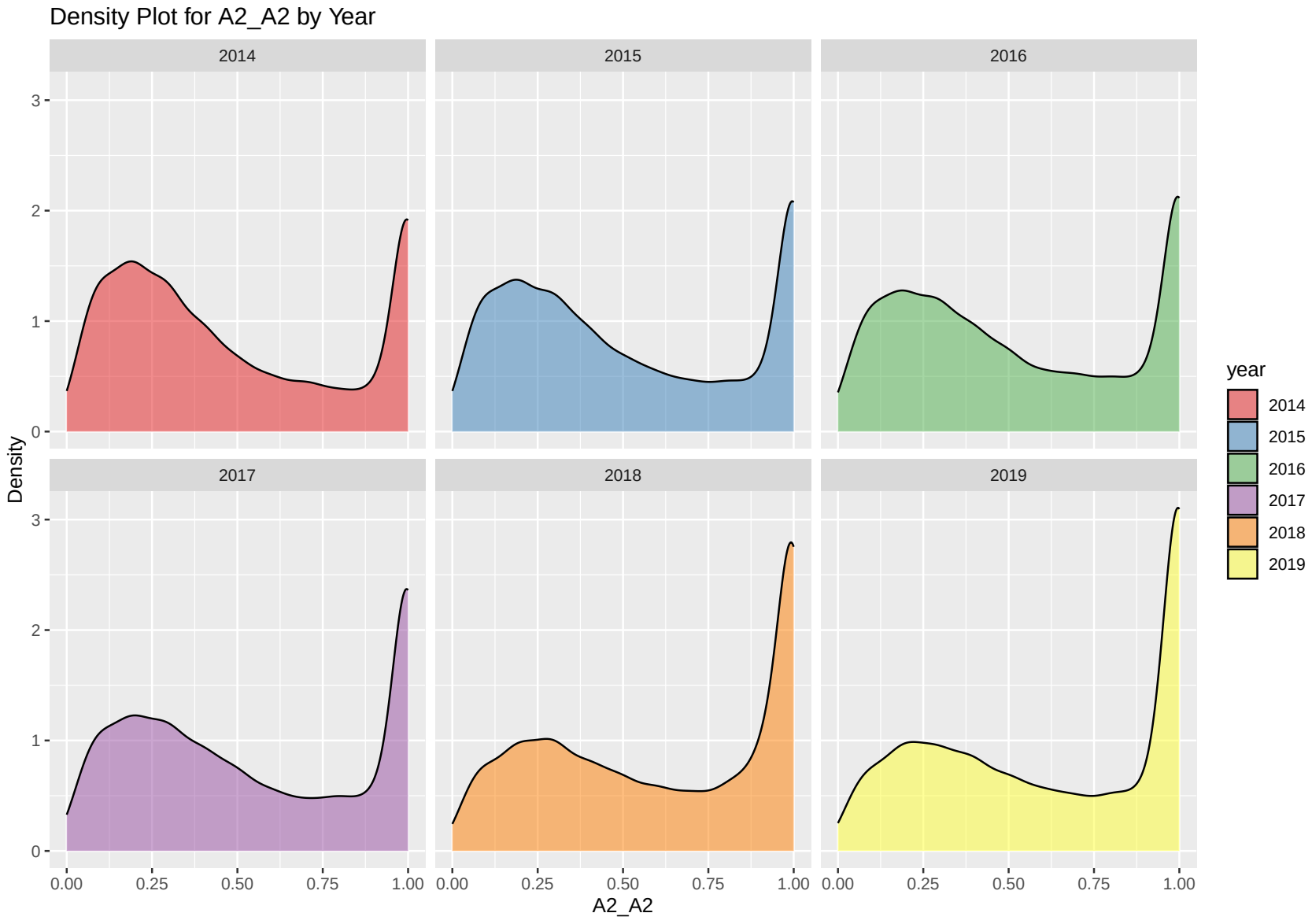
ACCESS variables III (Physical Access)

- Var name: Percentage of employees using the computer out of the total employees.
- Type: continuous
- Code: A2_A2

year	count	mean	sd	variance	median	min	max	IQR
2014	18832	0.4875	0.3351	0.1123	0.40	0	1	0.63
2015	19322	0.5144	0.3391	0.1150	0.43	0	1	0.69
2016	18892	0.5286	0.3372	0.1137	0.46	0	1	0.68
2017	21195	0.5456	0.3402	0.1158	0.49	0	1	0.70
2018	21825	0.6120	0.3352	0.1123	0.63	0	1	0.68
2019	18383	0.6216	0.3405	0.1159	0.64	0	1	0.70

ACCESS variables IV (Physical Access)

Density plot



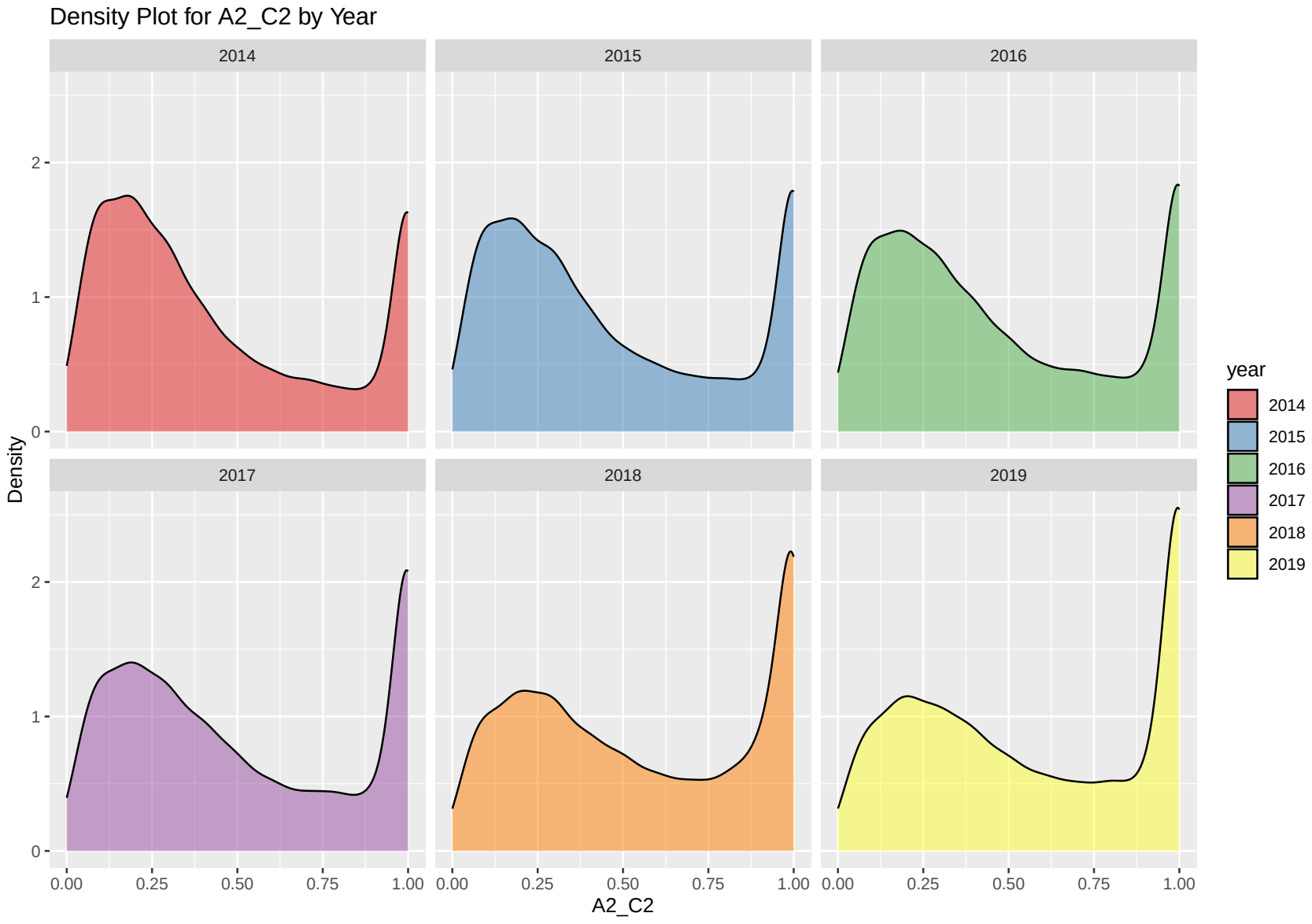
ACCESS variables V (Physical Access)

- Var name: Percentage of employees using computers connected to the internet.
- Type: continuous
- Code: A2_C2

year	count	mean	sd	variance	median	min	max	IQR
2014	18832	0.4390	0.3294	0.1085	0.33	0	1	0.54
2015	19322	0.4684	0.3359	0.1128	0.36	0	1	0.62
2016	18892	0.4820	0.3352	0.1124	0.39	0	1	0.61
2017	21195	0.5056	0.3393	0.1151	0.42	0	1	0.68
2018	21825	0.5567	0.3365	0.1132	0.51	0	1	0.67
2019	18383	0.5724	0.3419	0.1169	0.53	0	1	0.73

ACCESS variables VI (Physical Access)

Density plot



ACCESS variables VII (Physical Access)

- Var name: Enterprise provides mobile devices with mobile connection.
- Type: binary
- Code: A2_C5a

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.6959	0.2116	0.4600	0.69	0.70
2015	19322	0.7436	0.1907	0.4367	0.74	0.75
2016	18892	0.7595	0.1827	0.4274	0.75	0.77
2017	21195	0.7964	0.1621	0.4027	0.79	0.80
2018	21825	0.7512	0.1869	0.4324	0.75	0.76
2019	18383	0.8196	0.1479	0.3845	0.81	0.83

ACCESS variables VIII (Physical Access)

- Internet download speed low between 2 Mbit/s to 30 Mbit/s.
- Type: continuous
- Code: A2_C4_low

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.8221	0.1463	0.3825	0.82	0.83
2015	19322	0.7995	0.1603	0.4004	0.79	0.81
2016	18892	0.7504	0.1873	0.4328	0.74	0.76
2017	21195	0.6803	0.2175	0.4664	0.67	0.69
2018	21825	0.5790	0.2438	0.4937	0.57	0.59
2019	18383	0.4662	0.2489	0.4989	0.46	0.47

ACCESS variables IX (Physical Access)

- Internet download speed low between 2 Mbit/s to 30 Mbit/s.
- Type: continuous
- Code: A2_C4_high

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.1779	0.1463	0.3825	0.17	0.18
2015	19322	0.2005	0.1603	0.4004	0.19	0.21
2016	18892	0.2496	0.1873	0.4328	0.24	0.26
2017	21195	0.3197	0.2175	0.4664	0.31	0.33
2018	21825	0.4210	0.2438	0.4937	0.41	0.43
2019	18383	0.5338	0.2489	0.4989	0.53	0.54

SKILLS variables I

This category encompasses nine binary variables identified by the prefix “S”, which measure the presence and utilization of internal personnel for ICT tasks within enterprises. These variables span a range of functions from infrastructure maintenance to web development and IT security management, reflecting the enterprise’s depth of digital skills and training in key ICT domains.

SKILLS variables II

- Var name: Employment of specialists in computer subjects.
- Type: binary
- Code: S_B1

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.2870	0.2046	0.4524	0.28	0.29
2015	19322	0.3115	0.2145	0.4631	0.30	0.32
2016	18892	0.3235	0.2188	0.4678	0.32	0.33
2017	21195	0.3170	0.2165	0.4653	0.31	0.32
2018	21825	0.3206	0.2178	0.4667	0.31	0.33
2019	18383	0.3514	0.2279	0.4774	0.34	0.36

SKILLS variables III

- Var name: IT training courses for employees with specialist ict skills.
- Type: binary
- Code: S_B2a

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.1163	0.1028	0.3206	0.11	0.12
2015	19322	0.1279	0.1115	0.3340	0.12	0.13
2016	18892	0.1306	0.1135	0.3370	0.13	0.14
2017	21195	0.1342	0.1162	0.3409	0.13	0.14
2018	21825	0.1797	0.1474	0.3840	0.17	0.18
2019	18383	0.2089	0.1653	0.4066	0.20	0.21

SKILLS variables IV

- Use of internal personnel for ICT infrastructure maintenance.
- Type: binary
- Code: S_B5a1

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.2907	0.2062	0.4541	0.28	0.30
2015	19322	0.3055	0.2122	0.4606	0.30	0.31
2016	18892	0.3062	0.2124	0.4609	0.30	0.31
2017	21195	0.3027	0.2111	0.4594	0.30	0.31
2018	21825	0.2987	0.2095	0.4577	0.29	0.30
2019	18383	0.3256	0.2196	0.4686	0.32	0.33

SKILLS variables V

- Var name: Use of internal personnel for office software support.
- Type: binary
- Code: S_B5b1

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.4397	0.2464	0.4964	0.43	0.45
2015	19322	0.4552	0.2480	0.4980	0.45	0.46
2016	18892	0.4590	0.2483	0.4983	0.45	0.47
2017	21195	0.4496	0.2475	0.4975	0.44	0.46
2018	21825	0.4340	0.2456	0.4956	0.43	0.44
2019	18383	0.4715	0.2492	0.4992	0.46	0.48

SKILLS variables VI

- Var name: Use of internal personnel for enterprise software development.
- Type: binary
- Code: S_B5c1

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.1702	0.1412	0.3759	0.16	0.18
2015	19322	0.1813	0.1484	0.3853	0.18	0.19
2016	18892	0.1843	0.1503	0.3877	0.18	0.19
2017	21195	0.1785	0.1466	0.3830	0.17	0.18
2018	21825	0.1765	0.1453	0.3813	0.17	0.18
2019	18383	0.1975	0.1585	0.3981	0.19	0.20

SKILLS variables VII

- Var name: Use of internal personnel for enterprise software support.
- Type: binary
- Code: S_B5d1

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.2273	0.1756	0.4191	0.22	0.23
2015	19322	0.2361	0.1804	0.4247	0.23	0.24
2016	18892	0.2479	0.1864	0.4318	0.24	0.25
2017	21195	0.2406	0.1827	0.4274	0.23	0.25
2018	21825	0.2409	0.1829	0.4276	0.24	0.25
2019	18383	0.2642	0.1944	0.4409	0.26	0.27

SKILLS variables VIII

- Var name: Use of internal personnel for enterprise software support.
- Type: binary
- Code: S_B5e1

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.1549	0.1309	0.3619	0.15	0.16
2015	19322	0.1653	0.1380	0.3714	0.16	0.17
2016	18892	0.1650	0.1378	0.3712	0.16	0.17
2017	21195	0.1596	0.1341	0.3663	0.15	0.16
2018	21825	0.1557	0.1315	0.3626	0.15	0.16
2019	18383	0.1752	0.1445	0.3801	0.17	0.18

SKILLS variables IX

- Var name: Use of internal personnel for web development support.
- Type: binary
- Code: S_B5f1

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.1786	0.1467	0.3830	0.17	0.18
2015	19322	0.1901	0.1540	0.3924	0.18	0.20
2016	18892	0.1972	0.1583	0.3979	0.19	0.20
2017	21195	0.1847	0.1506	0.3880	0.18	0.19
2018	21825	0.1736	0.1435	0.3787	0.17	0.18
2019	18383	0.2022	0.1613	0.4016	0.20	0.21

SKILLS variables X

- Var name: Use of internal personnel for web development support.
- Type: binary
- Code: S_B5g1

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.3080	0.2131	0.4617	0.30	0.31
2015	19322	0.3375	0.2236	0.4729	0.33	0.34
2016	18892	0.3326	0.2220	0.4711	0.33	0.34
2017	21195	0.3185	0.2171	0.4659	0.31	0.32
2018	21825	0.2895	0.2057	0.4535	0.28	0.30
2019	18383	0.3427	0.2253	0.4746	0.34	0.35

USAGE variables I

This section details the usage category, which consists of 11 binary variables prefixed with "U", delineating how enterprises apply digital technologies across various functional domains. These variables are structured into distinct groups representing different business operations:

- **UM (Management)**: Variables under this prefix measure the integration of digital tools such as ERP and CRM in management processes and human resources management.
- **UMK (Marketing)**: These variables assess digital applications in marketing activities.
- **UC (Commerce)**: This group captures the use of digital technologies in e-commerce operations.

This classification helps highlight the diverse applications of digital technologies and the specific business functions they enhance within the enterprise.

USAGE variables II (Marketing)

- Var name: Use of Website
- Type: binary
- Code: UMK_C7

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.7477	0.1886	0.4344	0.74	0.75
2015	19322	0.7694	0.1774	0.4212	0.76	0.78
2016	18892	0.7902	0.1658	0.4072	0.78	0.80
2017	21195	0.7833	0.1697	0.4120	0.78	0.79
2018	21825	0.7940	0.1636	0.4044	0.79	0.80
2019	18383	0.8530	0.1254	0.3541	0.85	0.86

USAGE variables III (Marketing)

- Var name: possibility to place orders or reservations online eg online shopping cart
- Type: binary
- Code: UMK_C8c

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.4399	0.2464	0.4964	0.43	0.45
2015	19322	0.4428	0.2467	0.4967	0.44	0.45
2016	18892	0.4571	0.2482	0.4982	0.45	0.46
2017	21195	0.4797	0.2496	0.4996	0.47	0.49
2018	21825	0.4712	0.2492	0.4992	0.46	0.48
2019	18383	0.4290	0.2450	0.4949	0.42	0.44

USAGE variables IV (Marketing)

- Var name: Links or references to company profiles on social media
- Type: binary
- Code: UMK_C8h

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.3232	0.2187	0.4677	0.32	0.33
2015	19322	0.3844	0.2366	0.4865	0.38	0.39
2016	18892	0.4406	0.2465	0.4965	0.43	0.45
2017	21195	0.4751	0.2494	0.4994	0.47	0.48
2018	21825	0.5435	0.2481	0.4981	0.54	0.55
2019	18383	0.5518	0.2473	0.4973	0.54	0.56

USAGE variables V (Marketing)

- Var name: Use of social network.
- Type: binary
- Code: UMK_C10a

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.3301	0.2211	0.4703	0.32	0.34
2015	19322	0.3810	0.2358	0.4856	0.37	0.39
2016	18892	0.4360	0.2459	0.4959	0.43	0.44
2017	21195	0.4760	0.2494	0.4994	0.47	0.48
2018	21825	0.4517	0.2477	0.4977	0.45	0.46
2019	18383	0.5686	0.2453	0.4953	0.56	0.58

USAGE variables VI (Marketing)

- Var name: Social media and multimedia.
- Type: binary
- Code: UMK_C10c

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.1450	0.1240	0.3521	0.14	0.15
2015	19322	0.1742	0.1439	0.3793	0.17	0.18
2016	18892	0.2075	0.1644	0.4056	0.20	0.21
2017	21195	0.2274	0.1757	0.4192	0.22	0.23
2018	21825	0.2134	0.1679	0.4097	0.21	0.22
2019	18383	0.2930	0.2072	0.4551	0.29	0.30

USAGE variables VII (Management)

- Var name: Using ERP software
- Type: binary
- Code: UM_E1

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.4633	0.2487	0.4987	0.46	0.47
2015	19322	0.4681	0.2490	0.4990	0.46	0.48
2016	18892	0.4973	0.2500	0.5000	0.49	0.50
2017	21195	0.4978	0.2500	0.5000	0.49	0.50
2018	21825	0.4912	0.2499	0.4999	0.48	0.50
2019	18383	0.5092	0.2499	0.4999	0.50	0.52

USAGE variables VIII (Management)

- Var name: Use operational CRM software
- Type: binary
- Code: UM_E2b

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.2313	0.1778	0.4216	0.23	0.24
2015	19322	0.2410	0.1829	0.4277	0.23	0.25
2016	18892	0.2601	0.1924	0.4387	0.25	0.27
2017	21195	0.2539	0.1894	0.4352	0.25	0.26
2018	21825	0.2791	0.2012	0.4486	0.27	0.29
2019	18383	0.3702	0.2332	0.4829	0.36	0.38

USAGE variables IX (Management)

- Var name: Use analytical CRM software
- Type: binary
- Code: UM_E2a

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.3490	0.2272	0.4767	0.34	0.36
2015	19322	0.3522	0.2282	0.4777	0.35	0.36
2016	18892	0.3683	0.2327	0.4824	0.36	0.38
2017	21195	0.3663	0.2321	0.4818	0.36	0.37
2018	21825	0.3437	0.2256	0.4750	0.34	0.35
2019	18383	0.2386	0.1817	0.4263	0.23	0.24

USAGE variables XI (e-commerce)

- Var name: Possibility to place orders or reservations online eg online shopping cart
- Type: binary
- Code: UC_C8a

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.1706	0.1415	0.3762	0.17	0.18
2015	19322	0.1834	0.1498	0.3870	0.18	0.19
2016	18892	0.2000	0.1600	0.4000	0.19	0.21
2017	21195	0.2193	0.1712	0.4138	0.21	0.22
2018	21825	0.2250	0.1744	0.4176	0.22	0.23
2019	18383	0.2112	0.1666	0.4082	0.21	0.22

USAGE variables XII (e-commerce)

- Var name: Web sales through intermediary websites or ecommerce sites marketplaces or apps
- Type: binary
- Code: UC_J7

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.4624	0.2486	0.4986	0.46	0.47
2015	19322	0.4615	0.2485	0.4985	0.45	0.47
2016	18892	0.4893	0.2499	0.4999	0.48	0.50
2017	21195	0.4957	0.2500	0.5000	0.49	0.50
2018	21825	0.0856	0.0783	0.2798	0.08	0.09
2019	18383	0.0857	0.0784	0.2799	0.08	0.09

USAGE variables XIII (Human Resources)

- Var name: Announcement of vacancies or possibility to apply for employment online.
- Type: binary
- Code: UM_C8g

year	count	prop_1s	variance	std_dev	lo_95_CI	up_95_CI
2014	18832	0.2324	0.1784	0.4224	0.23	0.24
2015	19322	0.2486	0.1868	0.4322	0.24	0.25
2016	18892	0.2625	0.1936	0.4400	0.26	0.27
2017	21195	0.2653	0.1949	0.4415	0.26	0.27
2018	21825	0.2600	0.1924	0.4387	0.25	0.27
2019	18383	0.2994	0.2098	0.4580	0.29	0.31