Exploring the dispositional readiness of Latvian and Ukrainian university learners for digitalised work toward Industry 4.0

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Abstract: A global wave of digitalisation is transforming professional roles and technology-competency requirements across sectors. The deployment of intelligent systems is an especially significant development, introducing new forms of work, automation and human-machine partnering. This study explores dispositions of university students in Ukraine and Latvia as factors influencing readiness for digitalised work. Incorporating survey data collected by research teams in the host countries, an emergent research design was deployed. First, four data sets addressing attitudes toward technology and personal-cultural orientations of over a thousand students in two countries were received and prepared. Next, three characteristics of digitalised work were described, and five of the measured constructs were selected for analysis as readiness factors. These factors addressed optimism and anxiety toward information technology at work, tolerance for dynamic work environments, interest in learning about technology, and decision-making empowerment. After establishing the validity and reliability of the subscales, group-based response profiles were produced for each construct and differences between Latvians and Ukrainians investigated. Finally, a composite readiness profile was generated to compare dispositional alignments between the two respondent groups and the target. Findings will assist educators and human-resource managers address technology-related dispositions as vital facets of human readiness for digitalised work.

Keywords: Digitalisation; technology attitudes; cultural orientations; university students; Ukraine; Latvia.

1 Introduction

In the past decade, social scientists have conceptualised and measured the digital competencies of students, citizens and business professionals (Eshet 2012; Blayone 2019; Ferrari 2013; van Dijk and van Deursen 2014; Murawski and Bick 2017; Vieru 2015). Substantial findings have linked these competencies to tangible economic, social and cultural benefits (van Deursen and Helsper 2017; Scheerder et al. 2017; Helsper et al. 2015). To date, however, researchers have functioned with an interaction model that casts humans as digital masters and devices as passive tools (Grudin 2017). This casting becomes increasingly problematic as systems are programmed to learn, initiate actions towards a goal, show situational awareness and display other intelligent capacities (Franklin 2014; Romero et al. 2016a). Today, big data, AI, machine learning, the Internet of Things (IoT) and advanced interfaces enable new forms of human-computer interaction such as dynamic augmentation (Romero et al. 2016a) and hybrid teaming (Richert 2018), leading to a redistribution of productive capacities and operational control (Frank et al. 2019). Formerly the stuff of science fiction, digitalisation is driven by real-world initiatives like Industry 4.0 (Xu et al. 2018) and Society 5.0 (Fukuda 2019), which describe cyber-physical work environments requiring a well-prepared human workforce (Shahlaei et al. 2017).

To address the future of work, readiness researchers seek to identify, theorise and measure those factors enabling and thwarting human preparedness. Previous studies by the authors profiled the technology skills of Eastern European university students (Blayone et al. 2018a; Blayone et al. 2018b). This investigation shifts focus to dispositional orientations shaping readiness for digitalised work. An emergent research design was adopted (Hesse-Biber and Leavy 2008), incorporating data collected by teams in Ukraine and Latvia within the scope of two educational-reform projects. First, key characteristics of digitalised work activity were described, and relevant factors (selected from the measured constructs) were mapped to the target. Second, the subscales measuring the selected factors were then tested for validity and reliability before conducting quantitative analyses. Third, comparative profiles were produced to identify the size of dispositional response segments in each country. Finally, dispositional alignments and misalignments between the two national groups and three facets of digitalised work were assessed and visualised. Before the procedures and key findings are reported fully, the national contexts of this study are addressed in relation to technology readiness.

1.1 Technology Readiness in Context

Ukraine and Latvia are Eastern European nations that achieved independence following the dissolution of the Soviet Union in 1991. Ukraine, a country of over 42 million people and a Soviet republic for almost 70 years, has advanced through two recent peoples' revolutions—the Orange Revolution in 2004 and the Revolution of Dignity in 2014—each catalysing institutional reform and infrastructural development. Latvia, a country of about 2 million people, was a Soviet republic for 45 years. Its post-Soviet development has been less tumultuous, and it is now an EU member state.

Addressing the technology readiness of people in these nations, the Social Progress Index (2019a, 2019b) finds the highest levels of adult-literacy and mobile phone subscriptions by global standards. Also, Latvia is ranked twenty-ninth in the world with 82% of its population having Internet access, while Ukraine is ranked seventy-fourth with slightly less than 60% access. Digital-competency assessments of citizens are available via the International Telecommunications Union's (ITU) *Information Society Report* (2018), which shows large segments of the Latvian population possessing basic digital skills. Advanced skills, however, appear far less developed as is the trend in many EU nations. Although Ukraine is not represented in the ITU data set, two recent studies measured the digital competencies of university students in this country. Findings showed a wide distribution of basic competencies and a narrow distribution of advanced competencies such as those involving information management, data analyses and programming (Blayone et al. 2018a; Blayone et al. 2018b).

Although nation-level data addressing technology-related attitudes are rare, the World Values Survey asked respondents if "more emphasis on technology in everyday life would be a good thing" (Institute for Comparative Survey Research 2019). Within Ukraine, over 70% selected the most enthusiastic response. Data for Latvia is not available, but respondents from Estonia (Latvia's Baltic neighbour) were somewhat less enthusiastic with 59% responding most positively. Two cultural-value orientations (power distance and uncertainty avoidance), which appear relevant to human readiness for digitalised work, are profiled by Hofstede (2019b, 2019a). As theorised below, these orientations appear related to tolerance for unstructured environments and decentralised decision-making, and Latvians generally display a higher tolerance on both counts. Overall, these nation-level differences in digital competences, cultural values and attitudes toward technology suggest items to watch at the individual level of analysis.

2 Theoretical Apparatuses

Readiness research at the micro-level of individuals and groups addresses characteristics of people (*factors*) in relation to a *target* activity (F ⇔ T). Factors typically address sets of knowledge, skills and dispositions considered relevant to the target and which individuals can develop/learn (Blayone 2018). The target activity may address established work environments, or it may be an envisioned activity system such as Industry 4.0, which incorporates new roles, interpersonal dynamics and human-machine interactions. This study explores relationships between factors drawn from two dispositional frameworks and an envisioned activity system, as described below.

2.1 Factors A: Personal-Cultural Orientations

The personal-cultural orientations (PCO) model (Sharma 2009) synthesises an established nation-level framework (Hofstede 2001) with social-psychological findings addressing the same constructs at the individual level (Oyserman 2006; Oyserman et al. 2002). In this way, Sharma (2009) derives ten distinct orientations from five nation-level constructs as summarised in Table 1. Although rooted in the work of Hofstede, which was developed by surveying the values of IBM employees from 72 countries (Hofstede 2011), the PCO model extends the operational scope beyond corporate contexts and emphasises both culture and personality as determiners of individual values.

Table 1: Overview of factors addressing personal-cultural orientations

#	Factors	Derivation	Description of Orientation
1	Independence (IND)	*Individualism,* addressing the problem of self-concept and the responsibilities felt by individuals towards the collective, is the degree to which individuals focus on looking after themselves	A strong sense of independence, autonomy, personal freedom and achievement
2	Interdependence (INT)		A group identity/belonging, a responsibility to others within a social circle, and a focus on addressing shared goals
3	Power (POW)	*Power Distance,* addressing the social problem of inequality, is the degree to which less powerful members of an organisation or institution accept unequal distributions of decision-making power	The degree to which individuals accept hierarchically-structured power and decision-making in businesses and organisations
4	Social Inequality (IEQ)		The degree to which people tolerate differences in social status and equality
5	Risk Aversion (RSK)	*Uncertainty Avoidance,* addressing intolerance for ambiguity, is	Addressing the degree to which individuals seek to avoid risky situations and decisions

6	Ambiguity Intolerance (AMB)	the degree to which people feel uncomfortable with ill-defined problems and novel situations	Addressing the degree to which individuals lack tolerance for unstructured, open-ended and emergent tasks, activities and situations
7	Masculinity (MAS)	*Masculinity*, addressing dynamics of interaction and exchange between members of society, is the degree to which members are comfortable with competition versus nurturing	Associated with strong expressions of assertiveness, aggression, competitiveness and ambition
8	Gender Equality (GEQ)		Addressing perceptions of men and women as equal regarding roles, capabilities, rights and responsibilities
9	Tradition (TRD)	*Long-term Orientation*, addressing general living strategies, is the degree to which people focus on immediate needs versus longer-term investments	Associated with "traditional values" including respect for family and cultural heritage
10	Prudence (PRD)		Associated with long-term planning, hard work, sacrificing gratifications for future benefits and resilience

2.2 Factors B: Attitudes toward Information Technology

Five attitudes toward information technology (IT) were organised by American scholars to study worker shortages and gender differences in IT programs and workplaces (Gokhale et al. 2013). The foundation for this model is Allport's (1935) definition of attitudes as mental states of readiness, developed over time that influence an individual's response to related objects and situations (Gokhale et al. 2013). The five attitudinal complexes defined and operationalised by this Attitudes Toward Information Technology (A-IT) model are shown in Table 2. Pursuing a gender subtext, the A-IT ignores self-efficacy constructs because they are popular in the technology-readiness research (Litt 2013) and generally equally distributed among males and females (Cai et al. 2017).

Table 2: Overview of factors addressing attitudes toward information technology

#	Factors	Description
1	Positive effects of IT (PE)	Sense of optimism regarding the effects of IT at work.
2	Negative impact of IT (NI)	Sense of anxiety toward potential threats of IT to human wellness and the world.
3	Interest in learning about IT (LN)	Interest and motivation to engage with IT-related science, news, films and books.
4	Practical value of IT (PV)	Belief in the general value of IT for making people's lives better in multiple contexts.
5	Equality of opportunity in IT workplaces (GE)	Belief that IT workplaces provide equal opportunities to both males and females.

2.3 Target Activity

As envisioned by Industry 4.0 (Xu et al. 2018) and Society 5.0 (Fukuda 2019), digitalisation describes a pattern of socio-technical transformation precipitating new forms of automation, modes of production and human-machine interaction across market sectors and professional domains. For this study, three key characteristics of digitalised work activity were distilled from an integrative literature analysis (*Preparing for work in Industry 4.0: Modelling the target activity and worker-level readiness factors*. Manuscript submitted for publication). The first addresses the positioning of machines as intelligent agents capable of goal-directed action, autonomous decision making, situational adaptiveness and strategic collaboration (Romero et al. 2016a). Such machines will compensate for the cognitive, sensorial and physical limitations of humans through dynamic-augmentation (Romero et al. 2016a; Romero et al. 2016b), joint-cognitive systems (Jones et al. 2018) and hybrid teaming arrangements (Richert 2018). Thus, digitalisation will *decrease physical and cognitive distance between humans and machines requiring workers to possess a positive disposition toward technological entities*.

A second characteristic relates to heightened workplace dynamism produced by adaptive protocols and configurable systems (Fischer and Pöhler 2018; Hecklau et al. 2016). To function successfully in such environments, humans must develop a tolerance (or preference) for "run-time" problem-solving, ill-structured tasks and fluidity in team structures. As importantly, workers at all levels must possess high levels of intrinsic motivation for technology-related learning and (re)training (Freddi 2018; Hecklau et al. 2016; Hämäläinen et al. 2015).

A final characteristic relates to the breakdown of hierarchical structures within digitalised systems, and the redistribution of decision-making power to individuals with autonomic problem-solving capacities and strategic collaboration skills. This facet of digitalised work is addressed by holonic-systems theory, which defines "holons" as biological or non-biological entities capable of autonomous activity, information processing and purposeful interaction with other holons (Wang and Haghighi 2016; Pacaux-Lemoine et al. 2017). Digitalisation favours holonic power structures, and consequently, human workers should possess *high levels of decision-making empowerment and low psycho-cultural dependence on hierarchical control systems*.

Figure 1 summarises the theorised characteristics of digitalised work. Together they constitute a simplified target-activity model to which the readiness profiles generated in this study will be related.

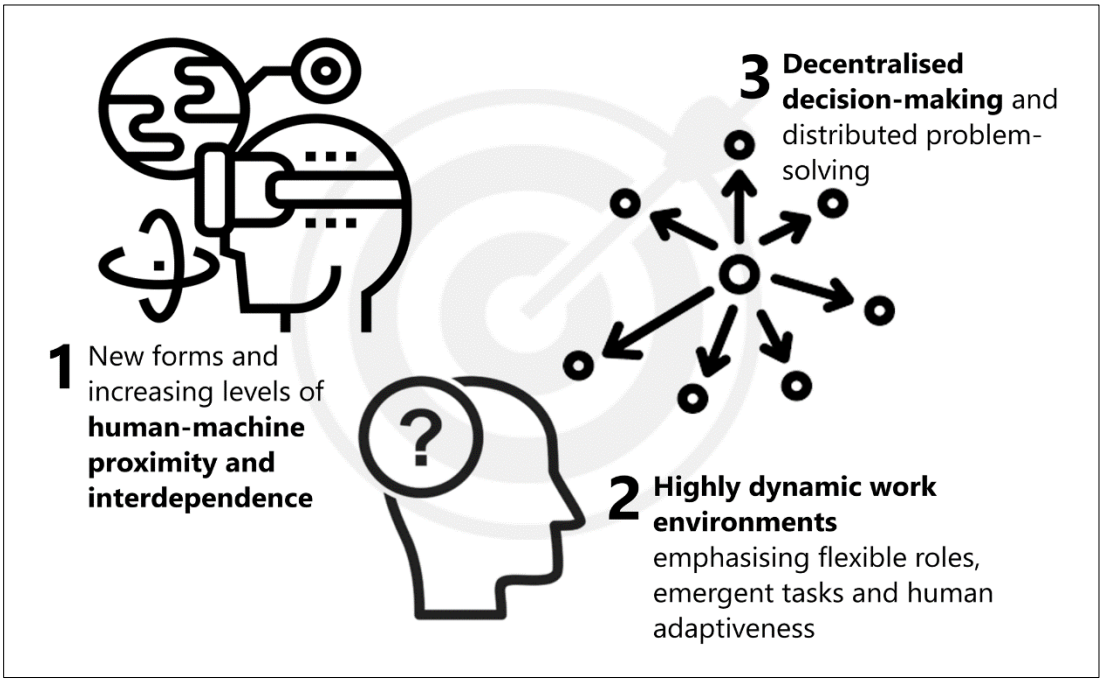

Fig.1 Three key facets of digitalised work environments—the target activity

2.4 Selecting Relevant Dispositional Factors

The authors selected five factors relevant to digitalised work from those measured by the PCO and A-IT instruments (Tables 1 and 2 above). These included three attitudes from the A-IT and two personal-cultural orientations from the PCO scale, as shown in Table 3. A positive attitude toward IT in work environments and low technology anxiety (measured by the A-IT PE and NI subscales) were related to human-machine interdependence. Intolerance to ambiguity and an interest in learning about technology (measured by PCO AMB and AI-T LN subscales) were related to technological and task dynamism. Finally, a strong sense of decision-making empowerment (measured by the PCO POW subscale was related to emergent problem-solving and decentralised control.

Table 3: Constructs positioned as readiness factors for digitalised work

#	Construct	Subscale	Target Alignment	Readiness Directionality
1	Optimism toward IT at work	A-IT PE	Characteristic 1: Human-machine proximity and interdependence	Higher levels preferred
2	Anxiety about IT in general	A-IT NI	Characteristic 1: Human-machine proximity and interdependence	Lower levels preferred

3	Intolerance toward ambiguous/unstructured situations	PCO AMB[a]	Characteristic 2: Highly dynamic and technologically complex work environments.	Lower levels preferred
4	Interest in learning about IT	AI-T LN	Characteristic 2: Highly dynamic and technologically complex work environments.	Higher levels preferred
5	Tolerance for hierarchical decision making	PCO POW[b]	Characteristic 3: Decentralised decision-making and front-line problem-solving.	Lower levels preferred

[a] AMB addresses ambiguity *intolerance* and therefore lower measurements represent higher levels of tolerance. [b] POW measures tolerance of top-down control and therefore lower levels indicate higher levels of decision-making empowerment.

3 Readiness Analysis

To assess the dispositional readiness of the participating students for digitalised work, data for the selected constructs were organised, relevant subscales validated, and quantitative analyses conducted. Comparative response profiles were constructed at the factor level, and significant differences between the national groups identified. Finally, a composite profile was produced, showing alignments and misalignments between the measured dispositions and the characteristics of digitalised work.

3.1 Data Collection

Associated research teams collected data in early 2019 following ethics reviews by scientific councils at the host universities. In Ukraine, respondents were recruited from Ternopil National Economic University (TNEU), a large university hosting about 24,000 students and 700 instructors in economics, business finance and information technology. In Latvia, respondents were recruited from Rēzekne Academy of Technologies, a regional university focused on education, engineering and economics. Data were collected using the A-IT scale, a 30-item instrument measuring five factors on a 5-point Likert scale of agreement, and the PCO scale, a 40-item instrument measuring ten factors on a 7-point Likert scale of agreement. The instruments were translated from English to Ukrainian and Latvian by two multi-lingual scholars and then reviewed by two other multi-lingual scholars. The 20 items, organised by subscale and supporting analysis in this data, are listed in the appendix. One item from the original A-IT NI subscale is not listed because it was excluded from the analysis owing to a translation error. The sociodemographic characteristics of respondents, organised by nation and instrument, are shown in Table 4.

Table 4: Sociodemographic characteristics of respondents by country and survey instrument

		Ukraine (PCO[a]: N=730; A-IT[b]: N=753)				Latvia (PCO: N=290; A-IT: N=260)			
Variables	Values	PCO	PCO %	A-IT[c]	A-IT%	PCO	PCO %	A-IT	A-IT %
Gender	Male	271	37%	282	37%	47	16%	44	17%
	Female	455	62%	467	62%	241	83%	213	82%
	No Response	4	<1%	4	<1%	2	<1%	3	<1%
Age Group	< 20	199	27%	-	-	28	10%	23	9%
	20-29	464	64%	-	-	100	34%	94	36%
	30-39	21	3%	-	-	54	19%	51	17%
	40-49	33	5%	-	-	30	10%	26	10%
	50+	13	2%	-	-	29	10%	16	6%
	No Response	0	0%	-	-	49	17%	50	19%

[a] PCO = Personal Cultural Orientations instrument; [b] A-IT = Attitudes toward Information Technology survey. [c] Age data was not collected with this instrument in Ukraine.

3.2 Validity and Reliability of Selected Subscales

The validity and reliability of the A-IT and PCO instruments were originally tested based on Western and East Asian samples (Gokhale et al. 2013; Sharma 2009). For this study, the validity and reliability of the selected subscales were tested via a three-step procedure (Crutzen and Peters 2017). First, an exploratory factor analysis was conducted. One poorly correlated item from the PE subscale was identified and checked for semantic consistency. Unlike all other items in the subscale, this item was not situated conceptually *in the workplace*. Therefore, on statistical and semantic bases, it was removed. Second, a confirmatory factor analysis was conducted. As shown in Table 5, the measures suggested a good fit for all subscales in both Ukraine and Latvia. (See Appendix for a list of subscales and constituent items used in this study.)

Table 5: Results of confirmatory factor analysis for the selected subscales[a]

Subscales	χ^2	df	χ^2/df	CFI	RMSEA	ci. (90%)	SRMR	PNFI
PE, NI, LN UA A-IT (N=753)	201.21	51	3.95	.937	.063	.054 - .072	.048	.709
PE, NI, LN LAT A-IT (N=260)	91.04	51	1.8	.966	.055	.036 - .073	.051	.716
AMB, POW UA PCO (N=730)	457.53	98	4.67	.900	.072	.065 - .078	.06	.707
AMB, POW LAT PCO (N=290)	262.32	98	2.76	.900	.076	.065 - .087	.063	.693

[a] For χ^2/df, good-fit ratios range from 5.0 to 2.0 with lower being better; For CFI, a good-fit value is greater or equal to .90, with some preferring .95; RMSEA values below .08 suggest a marginal fit, and below .07, a good fit; SRMR values below .08 suggest a marginal fit, and below .05, an excellent fit; PNFI good-fit values range from .5 to .9 (Hooper et al. 2008).

The third step was to examine the internal reliability of the scales with McDonald's omega (Dunn et al. 2014). As shown in Table 6, the LN subscale produced high

omega values (greater than .8), which is consistent with its conceptual tightness. The three-item PE and NI subscales produced omega values ranging from .6 to .72, suggesting a lower level of internal consistency. On the one hand, these values indicate that further instrument-development might be beneficial. On the other hand, given the conceptual breadth of the optimism- and anxiety-related attitudes measured by the three-item PE and NI subscales, these results were considered adequate for this study (Crutzen and Peters 2017). The two subscales drawn from the PCO instrument produced omega values from .72 to .79, suggesting good levels of internal consistency.

Table 6: Results of reliability testing via McDonald's omega

	Ukrainian Subscales					Latvian Subscales				
	PE	NI	LN	AMB	POW	PE	NI	LN	AMB	POW
ω	.6	.66	.84	.72	.75	.62	.72	.89	.74	.79

4 Data Analyses

Subscale item scores were averaged to generate a latent-construct score for each respondent. Rounded scores were used to position percentages of Ukrainians and Latvian in response segments for each of the constructs. High and low respondent segments included those individuals with average scores above and below neutral on the subscale. Investigation of significant differences between national groups on each subscale was conducted using an Independent Samples T-Test. This parametric test is robust even when analysing Likert-scale data with unequal variances and non-normal distributions (Norman 2010).

4.1.1 Factor 1: Optimism toward IT at work

Optimism toward IT at work was measured with the three-item PE subscale. As shown in Figure 2, large segments of respondents reported beliefs that IT contributes positively to work environments (43.4% measuring high in Ukraine and 33.5 % in Latvia). However, most respondents in both countries were neutral (44% Ukraine; 52.3% Latvia), and small segments were pessimistic (12.6% Ukraine and 14.2% Latvia). The difference in attitudes between Ukrainians (M = 3.34, SD = .73) and Latvians (M = 3.23, SD = .68) on this subscale *was significant*: t (1011) = -2.22, p = .027.

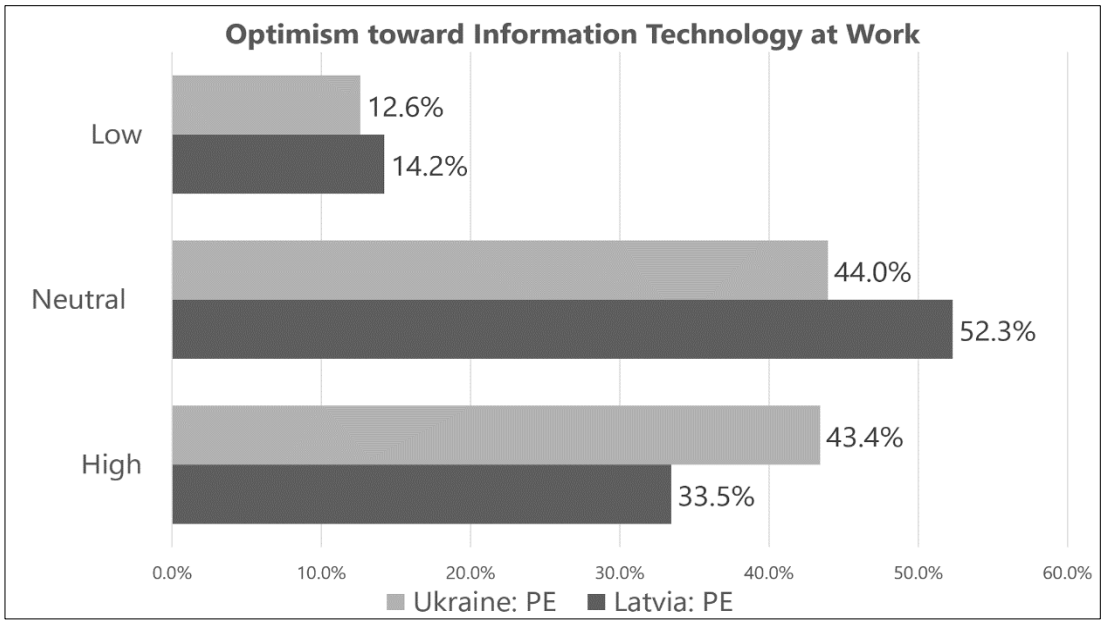

Fig.2 Response segments from the PE (A-IT) subscale (Latvia N=260; Ukraine N=753)

Factor 2: Anxiety toward negative IT impacts

Anxiety about potential negative impacts of IT was measured with the three-item NI subscale. As shown in Figure 3, most Ukrainians (43.2%) reported a low concern with negative impacts, with another sizable segment reporting a neutral disposition (41.2%). Only 15.7% reported high levels of concern. In Latvia, 31.2% of respondents reported a low concern with larger neutral (46.5%) and high-anxiety segments (22.3%). The difference in attitudes between Ukrainians (M = 2.7; SD = .82) and Latvians (M = 2.93, SD = .82) on this subscale *was significant*: t (1011) = 3.98, p = <.001.

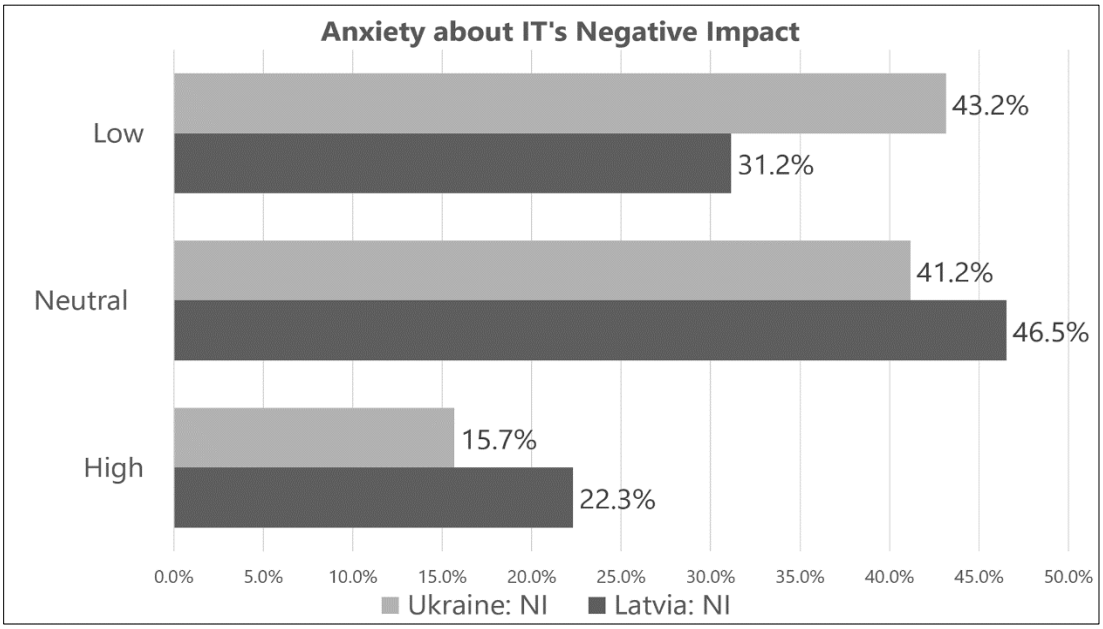

Fig.3 Response segments for the NI (A-IT) subscale (Latvia N=260; Ukraine N=753)

4.1.2 Factor 3: Intolerance for ambiguous work environments

Intolerance of ambiguous or unstructured work environments was measured using the four-item AMB subscale, in which lower levels of agreement suggest a more positive disposition toward highly dynamic and unstructured environments. Most respondents in both groups reported high levels of intolerance (Ukraine: 52.6%; Latvia: 59.7%) with substantial neutral segments. Only small numbers of respondents (Ukraine: 19%; Latvia: 13.8%) reported low intolerance. The difference in attitudes between Ukrainians (M = 4.38; SD = 1.14) and Latvians (M = 4.51, SD = 1.09) on this subscale was *not* significant: t (1018) = 1.58, p = .115.

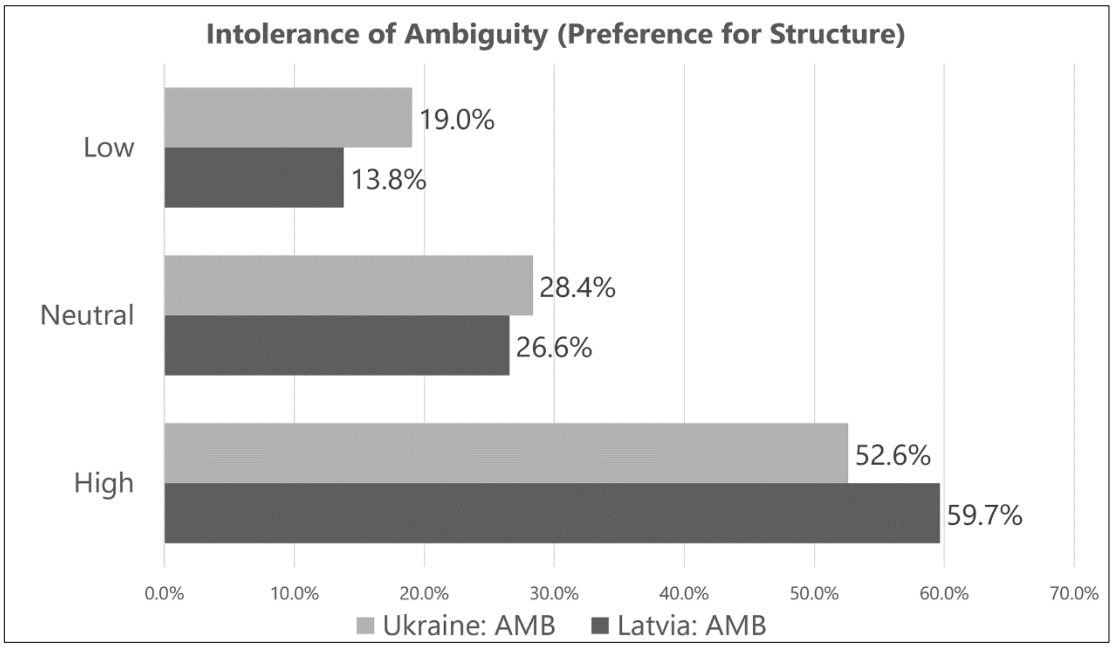

Fig.4 Response segments for the AMB (PCO) subscale (Latvia N=290; Ukraine N=730)

4.1.3 Factor 4: Interest in learning about IT

Interest in learning about IT was measured using the six-item LN subscale. As shown in Figure 7, most Ukrainian respondents (54.4%) reported a strong interest, with only 6% reporting a low interest. Among Latvia respondents, 43.1% reported a high interest, with 13.8% reporting a low interest. In both groups, neutral responses were substantial. The difference in attitudes between Ukrainians (M = 3.5; SD = .7) and Latvians (M = 3.2, SD = .77) on this subscale *was significant*: t (1011) = -5.36, p = <.001.

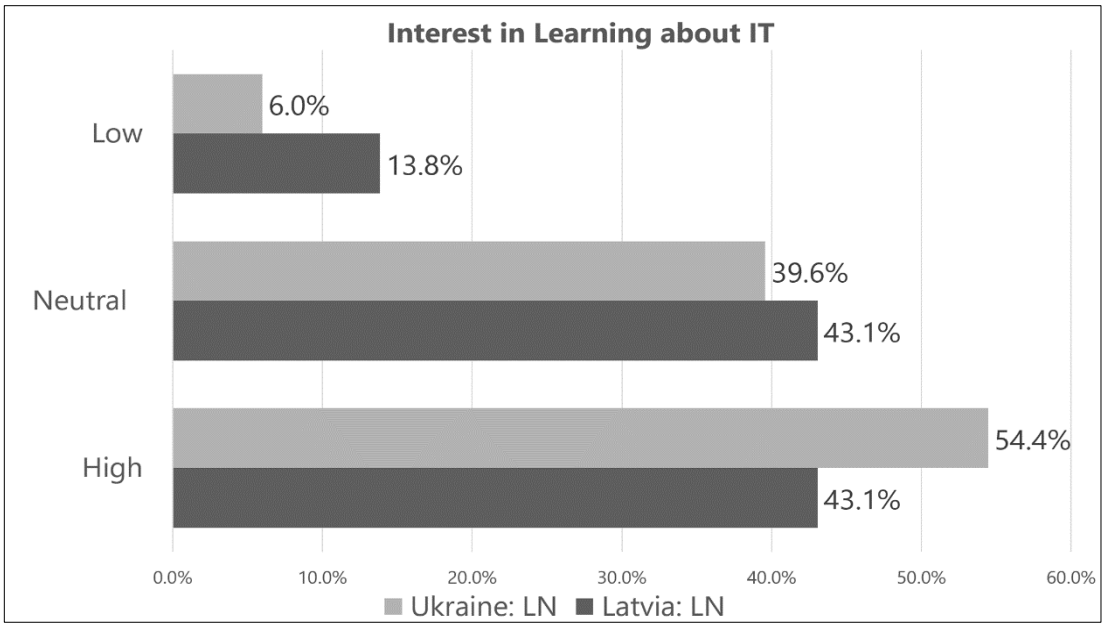

Fig.5 Response segments for the LN (A-IT) subscale (Latvia N=260; Ukraine N=753)

4.1.4 Factor 5: Decision-making empowerment

The decision-making empowerment of respondents was investigated using a four-item subscale measuring tolerance to "top-down" control. Less agreement with the items on this subscale suggested a higher sense of empowerment. As shown in Figure 8, 51.8% of Latvians and 42.7% of Ukrainians reported a strong tolerance for top-down decision-making. Only 29.6% of Ukrainians and 18.6% of Latvians reported a low level. In both nations, neutral responses were also substantial. The difference in

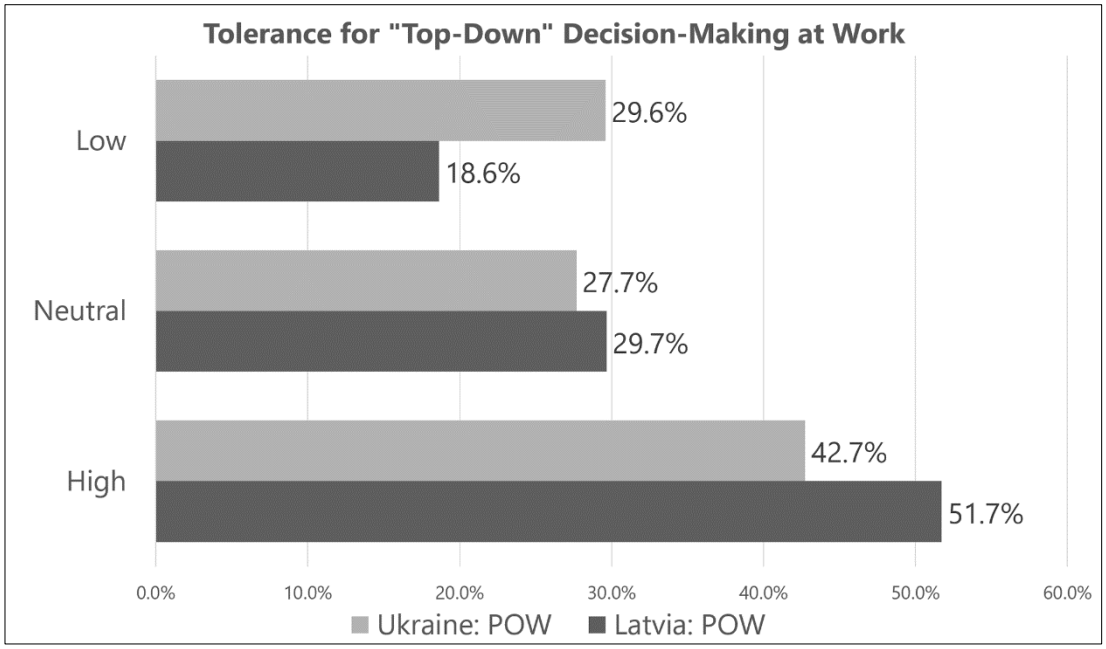

Fig.6 Response segments for the POW (PCO) reverse subscale (Latvia N=290; Ukraine N=730)

attitudes between Ukrainians (M = 4.0; SD = 1.2) and Latvians (M = 4.27, SD = 1.1) on this subscale *was significant*: t (1018) = 3.04, p = .002.

4.2 Composite Readiness Profile

The composite profile, shown in Figure 7, presents the respondent segments in each national group and on a factor-by-factor basis expressing: (a) high or very high levels of PE, suggesting an optimistic deposition toward IT in work environments aligned with increasing levels of human-machine intimacy; (b) low or very low levels of NI, suggesting minimal anxiety about negative impacts of IT on humans, also aligned with human-machine intimacy; (c) low or very low levels of AMB, indicating high tolerance towards unstructured roles and tasks aligned with highly dynamic work environments; (d) high or very high levels of LN, indicating a strong interest in learning about information technologies also aligned dynamic environments; and (e) low or very low levels of POW, indicating a predisposition toward bottom-up decision-making aligned with non-hierarchical work environments.

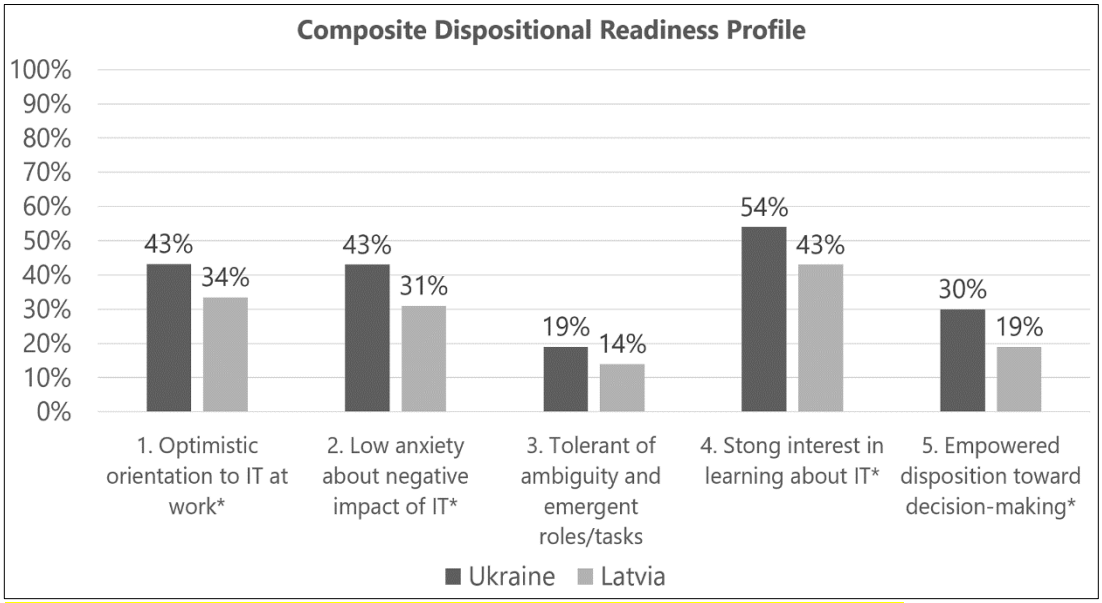

Fig.7 Summary of readiness findings with significant differences marked with asterisk

5 Discussion

The factor-level profiles were found to be both similar (AMB) and significantly different (PE, NI, LN and POW) for the Ukrainian and Latvian respondent groups. The composite readiness profile showed large segments from both nations with a strong interest in learning about IT, a vital disposition for career preparation and professional

development. That both countries have adopted English as a language for business and academic research will ensure access to vast online educational resources for developing technical knowledge and skills. Sizable portions of both groups also recognise the positive effects of IT and report low anxiety about potential negative impacts. These positive dispositions are consistent with broad access to mobile devices and the internet (International Telecommunication Union 2019) and bode well for a productive transition to digitalised work environments.

The two measured personal-cultural orientations may present challenges for some. A majority of both Ukrainian and Latvia respondents reported high levels of ambiguity intolerance, suggesting a misalignment with contextual dynamism, unstructured activities and emergent problem-solving characteristic of digitalised work. These levels of ambiguity intolerance are consistent with nation-level cultural profiles for both Ukraine and Latvia (Hofstede Insights 2019b, 2019a). The second personal-cultural orientation addressed a disposition related to control dynamics. Most Latvians and large segment of Ukrainians reported high acceptance of top-down control—an orientation that appears misaligned with holonic systems and non-hierarchical decision-making protocols. Here, the Ukrainian response is most consistent with the nation-level cultural profile (Hofstede Insights 2019b). Somewhat surprisingly, the Latvian response is less consistent with a mid-range nation-level score (Hofstede Insights 2019a). Given that many respondents are pedagogical students, this attitude may reflect enculturation into a traditional educational subculture.

Overall, Ukrainian respondents showed stronger dispositional alignments with digitalised work than Latvians, with larger segments reporting an enthusiasm for learning about IT, positive attitudes toward information technology and a preference for non-hierarchical decision-making. In Ukraine, these attitudes are consistent with shifting values towards openness and personal empowerment reported, for example, by Euromaidan student activists (Sviatnenko and Vinogradov 2014). An important unknown in the data, however, relates to pronounced neutral segments, which are similar in size across subscales and national groups. Responses from these neutral segments are especially difficult to interpret because both national cultures strongly favour restrained expression (Hofstede Insights 2019b, 2019a). Thus, to what degree neutral respondents possess neutral attitudes is a question for future research.

Both countries are pursuing educational-reform programs that could facilitate greater levels of dispositional readiness. In our view, forms of digital learning that eschew instructivist pedagogies and adopt technologically experimental, democratised,

inquiry-based, connectivist and related active-learning perspectives, appear strongly aligned with the dynamics of digitalised work (Veletsianos 2016; vanOostveen et al. 2016; Blayone et al. 2017; Garrison 2017; Anderson 2016). Addressing these alignments in collaboration with academic partners in Ukraine and Latvia remains a priority for this study's sponsoring projects.

5.1 Contributions and Limitations

This study presents original findings addressing differences in dispositions toward technology of Latvian and Ukrainian university students. Second, it initiates a shift in digital-readiness research from an operator-tool interaction perspective to a human-machine interdependence orientation. Third, it theorises attitudinal and personal-cultural orientations as factors influencing worker preparedness for digitalised work. Finally, it suggests avenues for educational transformation and digital learning in Ukraine and Latvia aligned with the future of work.

Several limitations are acknowledged. First, owing to the international scope of the project and independence of the participating research teams, there were limitations in data collection. For example, socio-demographic data were not gathered consistently across all surveys in both contexts. Second, CFA and reliability testing suggested that some of the subscales deployed in this study exhibited marginal levels of internal consistency. Third, the target activity (digitalised work) represents a generalised and still underdetermined construct. As an example, it is unclear to what degree a new technological system triggers changes to practices of hierarchical control that are otherwise culturally dominant. A study of Brazilian manufacturers reported that even the most advanced Industry 4.0 implementations tended to reproduce centralised decision-making protocols (Frank et al. 2019). Finally, in executing this study, readiness data was obtained via existing self-report instruments originally designed for other purposes. Future projects should develop original models and instruments, theorised and operationalised in direct relation to digitalised work.

5.2 Conclusion

This study explored the dispositional readiness of Ukrainian and Latvia university students for digitalised work. Factor-level analyses of the national groups demonstrated a similarity (ambiguity intolerance) and four significant differences (attitudes towards IT effects and impacts, motivation to learn about IT and decision-making orientation). Based on these findings, a composite profile showed large segments interested in learning about IT (well-aligned with dynamic technological

environments) and optimistic depositions toward IT effects/impacts (well-aligned with increasing levels of human-machine interdependence). At the same time, large segments also expressed intolerance for unstructured work environments and a strong acceptance of top-down decision-making—two orientations that appear misaligned with the dynamism of digitalised work.

Suggested next steps include developing original factor/target models, extending the scope of data collection to other national contexts, and pursuing mixed-methods analyses (e.g., combing survey data with interviews and case studies). The authors welcome feedback and partnerships from others interested in future projects.

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Appendix: Selected Subscales

Positive effect of IT on work life (A-IT)

PE1: In general, information technology (Information Technology) will create more jobs than it eliminates

PE2: Because of Information Technology, work will become more appealing

PE3: Family-friendly environments are more available in Information Technology occupations than others

Negative impact of IT (A-IT)

NI2: Advancements in Information Technology will eventually destroy the earth

NI3: People would do better by living a simpler life without so much Information Technology

NI4: Information Technology applications create an artificial and inhuman way of living

Interest in learning about IT (A-IT)

LN1: I enjoy learning about new Information Technology discoveries

LN2: I am well informed about new developments in Information Technology

LN3: I am interested in new applications of Information Technology for improving our lives

LN4: I like to read about Information Technology-related topics

LN5: I like to watch films and videos that have Information Technology-related themes

LN6: I have looked for information about Information Technology advances on the Internet

Orientation toward top-down decision making (PCO)

POW1 I easily conform to the wishes of someone in a higher position than mine

POW2 It is difficult for me to refuse a request if someone senior asks me

POW3 I tend to follow orders without asking any questions

POW4 I find it hard to disagree with authority figures

Intolerance toward unstructured work environments (PCO)

AMB1 I find it difficult to function without clear directions and instructions

AMB2 I prefer specific instructions to broad guidelines

AMB3 I tend to get anxious easily when I don’t know an outcome

AMB4 I feel stressful when I cannot predict consequences