Music360

A 360 DEGREES PERSPECTIVE ON THE VALUE OF MUSIC

D6.6 Living Labs Second Round

Disclaimer

The Music360 project has received funding from the European Union's Horizon Europe research and innovation action under grant agreement number 101094872.

Version history			
Ver.	Date	Comments/Changes	Author/Reviewer
0.1	27 february 2026	Draft version	Ingmar Leijen, Lisa NíChoisdealbha (eds.)
1.0	5 march 2026	Added RAAP/PPI case and Experimentation Toolkit	Jaap Gordijn/Sander Teekens

Project Title	360 DEGREES PERSPECTIVE ON THE VALUE OF MUSIC	
Project Number	101094872	
Project Start-End Date	01/03/2023 - /1/03/2026	
Work Package	WP 6.6	
Deliverable	D6.6 Living Labs Second Round	
Status	Final	
Date of this version	27-02-2026	
Due Date	28-02-2026	
Deadline for comments	23-02-2026	
Submitted	05-03/2026	
Dissemination Level[1]	CONFIDENTIAL	
Deliverable Responsible	Ingmar Leijen/Lisa NíChoisdealbha	
Author(s)		
	M. de Miguel Molina	UPV
	B. de Miguel Molina	UPV

[1] PU= Public, CO=Confidential, only for members of the consortium (including the Commission Services), CL=Classified, as referred to in Commission Decision 2001/844/EC

	J. Gordijn	VU
	P. Verlegh	VU
	R.J. Wieringa	TVE
	B. Gaminha	GDA
	S. Teekens	SENA
	F. Lucassen	BUMA-STEMRA
	D. Catala Perez	UPV
	C. Carracosca	UPV
	O. Pastor	UPV
	G. Giachetti	UPV
	Denis Guilhot	BMAT
	Gonçal Calvo	BMAT
	B. Gaminha	GDA
	Piia Moore	GTM
	Ingmar Leijen	VU
	Lisa NíChoisdealbha	IMRO
Reviewer(s)	Ioan Kaes	Aepo-Artis

Contents

Abstract

This deliverable presents results from the second round of Living Labs conducted within the Horizon Europe Music360 project, which aims to develop an evidence-based understanding of the cultural, social, economic, and organisational value of music. Across five national Living Labs (Portugal, Ireland, the Netherlands, Finland, and two in Spain) the project investigated how music is used, perceived, and valued in public, commercial, cultural, and healthcare environments.

The Portuguese Living Lab demonstrates the feasibility and relevance of transitioning from broadcast proxy models of neighbouring rights distribution to data-driven allocation based on actual in-venue music usage, showing that although venue repertoires are heterogeneous and long-tailed, the most economically relevant tracks overlap with broadcast repertoires. The Irish Living Lab reveals how music functions as a strategic asset shaping brand identity, customer experience, and staff performance in hospitality venues. The Dutch Living Lab, the largest field experiment on music tempo to date, finds no effect of tempo on sales but identifies significant positive effects of slow music on employee affect and job satisfaction, underscoring music's role in servicescape dynamics. The Finnish study compared the effects of familiar, licensed music and unfamiliar, copyright-free music in retail, finding that while customer mood, evaluations, and purchasing behavior remained largely unchanged, familiar music was perceived as more enjoyable and a better fit with the store atmosphere. Employees, however, experienced notable benefits from familiar music, including improved mood, higher energy, and more positive evaluations of the store environment. Two Spanish Living Labs highlight the cultural, social, and ethical values of music in a supermarket and a major cultural festival, showing strong links between music, authenticity, memorability, and participant loyalty. A final Spanish Living Lab in an oncology unit shows that both recorded music relaxation sessions and live mini concerts improve psychological and physiological symptoms among cancer patients, though through distinct mechanisms. The deliverable concludes with a Living Lab with an international Living Lab, namely the RAAP/PPI case.

Together, the Living Labs provide robust empirical evidence that music generates multidimensional value across societal domains and that integrating real world usage data can enhance fairness, wellbeing, and cultural vitality in the European music ecosystem.

1 Introduction

The MUSIC360 Living Labs constitute an international research programme designed to generate empirical evidence on the use, impact, and value of music in a diverse set of public, commercial, cultural, and clinical environments. Across Portugal, Ireland, Finland, the Netherlands, and Spain, the Living Labs examine music from different angles, ranging from technical measurement of background music usage to psychological, commercial, and sociocultural effects on customers, employees, patients, and organisations. Although the specific sectors and methodologies differ across national implementations, the initiative is unified by a central objective: to develop an evidence based understanding of how music functions in real world settings, and to assess the implications for policy, rights management, commercial practice, and societal wellbeing.

Current report describes the outcomes of a set of international investigations of the value of music. Research on musical value spanned a variety of countries, topics, using mixed methods and research designs, all focusing on different aspects of musical value. Based on a value framework developed in the first iteration of the living labs, each partner in the project performed one or more investigations.

Across contemporary societies, music plays a multifaceted role. It can shape cultural identity, support social interaction, enhance the experience of commercial environments, and affect emotional and physiological well-being. In public venues such as restaurants, retail stores, cultural festivals, and hospitals, music is more than a background element: it is an active component of experience design, behavioural shaping, and value creation. Despite its omnipresence, the mechanisms through which music generates value, economic, cultural, social, and psychological, remain insufficiently understood. This knowledge gap has significant consequences. Venue owners often lack evidence-based insights into how music affects their customers and staff. Creators and performers rarely receive transparent information about when and where their music is used. Collective Management Organisations (CMOs) rely heavily on proxy-based systems that reflect broadcast repertoires rather than real-world usage, resulting in distribution inaccuracies. Policymakers, meanwhile, are left without reliable tools to evaluate the societal contribution of music at scale.

The Music360 project addresses these challenges using a collection of international investigations using the Living Lab methodology. Living Labs are real-world experimental contexts that allow researchers, stakeholders, and end-users to jointly explore the impact of music under naturalistic conditions. Rather than relying solely on controlled laboratory studies or retrospective surveys, Living Labs make use of a variety of research instruments, such as audio fingerprinting, behavioural observation, surveys, and data analytics, directly probing the effect of music in everyday

environments. This approach ensures that findings reflect the complexity of actual music use, allowing researchers to capture subtle behavioural, experiential, and economic effects beyond the more artificial lab environment.

Using a newly developed comprehensive framework of musical value, the second round of Living Labs, described in the present report, implements applied studies across Portugal, Ireland, the Netherlands, Finland, and Spain. The used framework distinguishes between economic, cultural, social, emotional, and ethical forms of value, emphasising that music's contribution to society cannot be reduced to financial metrics alone. Each national study investigates a unique facet of musical value: the fairness of evidence-based rights distribution, the influence of curated music in hospitality and retail settings, the effect of musical tempo on shoppers and retail staff, the cultural and social significance of music in public and festive events, and the therapeutic potential of music in clinical environments.

Together, these studies show diverse aspects of how music can create value in all kinds of use situations. They demonstrate that value emerges through reciprocal interactions between music, people, and context. In some environments, such as bars and restaurants, music is a strategic commercial asset that shapes brand identity, atmosphere, and customer behaviour. In retail settings, music affects the emotional states and productivity of employees, while its effect on consumers may be more nuanced than previously assumed. At cultural festivals, music enhances authenticity, community cohesion, and memorability, strengthening attendees' emotional bonds with the event. In healthcare settings, carefully designed musical interventions seem to have a reducing effect on anxiety, fatigue, and discomfort, supporting both psychological resilience and physical well-being.

Beyond describing these effects, this report describes methodological innovations that make them measurable. The use of audio fingerprinting technologies allows for the possibility of tracking in-venue music usage, offering CMOs and policymakers a scalable alternative to traditional proxy-based models. Integration of survey data, sensor-based observations and authors' rights databases enables researchers to map relationships between exposure to music and its impact across different stakeholders and situations. This evidence base offers a foundation for fairer royalty distribution systems, better-informed licensing policies, and more effective use of music as a tool for social and economic value creation.

In summary, the international investigations described in this report provide a holistic perspective on the value of music. They offer empirical insights that can guide creators, venues, CMOs, policymakers, and cultural institutions in making informed decisions about the role of music in public life. The findings corroborate that music is not merely an aesthetic accompaniment to daily activities, but a powerful force shaping experiences, behaviours, and societal outcomes across diverse contexts.

Next chapters contain the descriptions of the second wave of living labs that have taken place in the context of the Music360 project.

2 Portuguese living lab

Bruno Gaminha, GDA, Lisbon, Portugal

2.1 Abstract

This deliverable presents the results of the Portuguese Living Lab developed under the MUSIC360 project, designed to evaluate the implications of transitioning from proxy based to evidence based models for the distribution of neighbouring rights. By integrating continuous in venue music monitoring through audio fingerprinting, broadcast usage data, and rights accurate repertoire and performer metadata, the Living Lab provides a systematic, track level comparison between actual venue usage and the broadcast centric reference model currently applied in the Collective Management Organisations framework. The analysis reveals that while venue repertoires are highly heterogeneous and only partially overlap with broadcast repertoires, the shared subset corresponds to the most intensively used recordings, moderating the distributional impact of missing long tail content in proxy based models. Complementary survey data from 1,438 licensed venues show that streaming services and radio dominate real world music sourcing, that genre choices concentrate around mainstream and atmosphere oriented repertoires, and that 80% of venues support a remuneration model aligned with actual usage. Combined, these results demonstrate both the necessity and the practical viability of incorporating direct venue usage evidence into rights distribution workflows. The Portuguese Living Lab therefore establishes a robust empirical foundation for developing fairer, evidence driven allocation models and for understanding sector specific music usage behaviours across the Portuguese public venue ecosystem.

2.2 Introduction

Collective licensing for the use of background music in public venues rests on a simple legal-economic premise: when recorded or broadcast music is used publicly in shops, restaurants, cafés, sports clubs, supermarkets, and similar spaces, venues are obliged to compensate rightsholders for that use. Those financial compensations, covering neighbouring rights in recordings for performers and producers and authors' rights for composers and lyricists, are typically collected by Collective Management Organizations (CMOs), which then distribute the earnings to rightsholders. This long-standing framework has become a critical revenue stream for rightsholders, increasing the importance of accurate, fair, and timely distribution.

In principle, two fairness requirements follow. First, distributions should reflect actual usage of recorded and protected music: money collected from professional uses of background music should flow proportionally to those recordings and works that are, in fact, performed in public spaces. Second, licensing tariffs and the justification of those tariffs should reflect the value created by music in each venue, economically (e.g., effects on sales, dwell time, willingness to pay) and non-monetarily (e.g., atmosphere, brand fit, well-being). These goals are explicitly captured by Music360's Challenge C1 ("fair distribution based on actual use") and Challenge C2 ("value-based fair compensation"), which together seek to replace coarse proxies with fine-grained evidence about use and impact.

In practice, ideal allocation and valuation face well-known constraints. Usage information is fragmented across heterogeneous sources, often available with lags, partially accessible, of low quality, and costly to acquire and process at the required granularity for per-track, per-venue inference. CMOs' data pipelines historically rely on reference playlists (e.g., the "top twenty" radio stations) or periodic market research samples, approaches that are inexpensive at scale but could potentially and systematically miss long-tail, local, and context-specific venue repertoires. The result could be a fragmented view of both usage and value potential, which, at the limit, could harm rightsholders whose recordings are heavily used in venues yet rarely broadcast by the sources used to construct the reference playlists.

These frictions motivate the construction by CMOs of representation models that combine multiple data sources to approximate the music used in venues, thereby sustaining distribution decisions. Concretely, prevailing inputs include (i) broadcast playlists from radio and television; (ii) usage reports and catalogues from background-music suppliers; and (iii) market research instruments that sample venue repertoires and audience responses. While such multi-source models improve coverage relative to single-source references, they remain proxies unless complemented with direct, venue-level observation.

The Music360 Portuguese Living Lab addresses this evidentiary gap by deploying distributed data collection and extensive analytics designed to measure background music usage and value at fine granularity. Technically, we integrated music venue monitoring via music fingerprinting technology (provided by BMAT), rightsholder and repertoire data from CMOs, and ecosystem-level questions. With this approach, we intend to evaluate the implications of a progressive shift from proxy-based to evidence-based distribution.

Within this architecture, the Portuguese Living Lab provides a field test of fairness in distribution grounded in actual venue usage. Its three objectives were (1) to understand the repertoire effectively played in venues; (2) to measure the intensity of that usage and compare it to intensity on radio and

television; and (3) to compare distributions computed under the traditional broadcast-centric model with distributions recomputed from in-venue measurements. The lab is implemented with BMAT's venue monitoring and a cohort of venues.

Our study examines the implications of incorporating direct venue-usage evidence into the revenue distribution model for venue licensing in Portugal, with a particular focus on performers. By design, the lab assesses divergences between venue repertoires and those inferred from radio/TV references and quantifies the distributional shifts that follow from replacing proxies with ground truth.

Methodologically, we couple the continuous monitoring of background music in participating venues via audio fingerprinting and subsequent track-level matching with the integration of CMO repertoire/rights metadata and established broadcast datasets. This enables a consistent, track-granular comparison of usage intensities across media contexts (venues vs. radio/television) and the computation of distribution weights under alternative evidence regimes.

2.3 Methodology

2.3.1 Study design and identification strategy

We conduct an observational, living-lab study that contrasts two allocation regimes for public-performance neighbouring rights in Portugal:

- a Broadcast-Proxy Model (BPM), which reproduces GDA's status-quo reference model for venue distributions based on monitored radio and television broadcasts; and
- a Venue-Evidence Model (VEM), which reallocates the same venue-licensing pool using direct, in-venue measurements of actual music usage.

The identification logic is straightforward: if the repertoire and intensity of music actually used in venues differ from broadcast repertoires, then performer payout shares computed from BPM will be biased relative to the VEM counterfactual. By measuring venue usage continuously and linking plays to performer rights, we can (i) quantify repertoire divergence and (ii) estimate the distributional shift that follows from replacing broadcast proxies with venue evidence. The approach follows the MUSIC360 living-lab architecture, which features continuous monitoring via audio fingerprinting (BMAT), linkage to CMO repertoires, and stakeholder dashboards, designed precisely to enable evidence-based distribution and value analysis under confidentiality constraints.

2.3.2 Setting, period, and comparison groups

The venues, radios, and television stations, when available, were monitored from 1 January 2024 through 31 October 2025 (inclusive, 670 days).

During the Portuguese Living Lab, we recruited 14 Portuguese venues for the study. The venues were recruited from the GDA and Audiogest rights-paying venue networks and are characterised by not using radio or TV as their primary music distribution channel; as a result, these venues may be part of the group of venues whose used music set is potentially underrepresented in the current distribution framework.

The 29 radio and television stations used to build the broadcast reference group include all national Portuguese radio stations, a set of local radio stations, the national, publicly available television stations, and television stations that broadcast specific repertoires historically underrepresented in national radio stations, such as young children's repertoire. The 29 radio and television stations are included in GDA's broadcast reference and used to construct the BPM for venue distributions.

2.3.3 Data sources

2.3.4 Venue usage (primary evidence)

We deploy audio recognition devices using music fingerprinting to detect and time-stamp track plays in each venue. Detected excerpts are matched and paired with metadata (recording identifiers, artist names) before rights linkage. Device and pipeline design follow MUSIC360's standardised collection framework.

The list of venues monitored is presented in Table 2.1.

Table 2.1 – List of venues monitored

Venue name	Total number of plays	Total play time
DOTE AV IGREJA	84 330	4251h 46m 2s
TR3S LISBOA	73 736	3818h 33m 23s
O PREGO DA PEIXARIA	67 547	4053h 22m 55s
SEA ME PEIXARIA MODERNA	54 061	3272h 42m 48s
HAVANA	35 680	1597h 25m 0s
GRAÇA DO VINHO	31 681	1896h 56m 42s

RESTAURANTE ARCADAS O FAIA	17 763	1038h 8m 52s
NB Viseu	13 851	354h 49m 27s
BAR CRU	11 545	541h 59m 9s
BAR 10A	10 530	595h 44m 44s
MATIZ POMBALINA BAR	83 980	467h 50m 20s
Zoom Porto	6 610	211h 7m 17s
SHELTER BAR	6 280	294h 12m 33s
LOUNGE	3 613	181h 46m 27s

2.3.5 Broadcast usage (reference evidence)

For each of the 29 radio/TV stations, we compile the per-track number of broadcasts over the same period using the BMAT monitoring system. In line with current practice, the number of times a sound recording is broadcast is the unit that underpins proportional allocation in the BPM.

The list of radios and television stations monitored is presented in Table 2.2.

Table 2.2 – List of radios and television stations

Venue name	Total number of plays	Total play time
Orbital	316 112	11802h 8m 57s
Batida FM (former Vodafone FM)	302 667	15565h 24m 38s
Cidade FM	281 184	13734h 48m 31s
Mega FM	274 394	13474h 52m 48s
Nova Era	264 677	12534h 26m 57s
V+ TVI (former TVI FICÇÃO)	241 286	4434h 19m 9s
RFM	225 596	11959h 5m 32s
Comercial	222 791	12036h 58m 23s
Smooth FM	210 418	12219h 54m 33s

Amalia	200 303	9857h 53m 58s
M80	200 282	12408h 56m 9s
SIC	191 809	3591h 22m 0s
Radio No Ar	182 729	10395h 53m 44s
RDP Antena 3	172 079	9456h 51m 53s
RR	171 468	9500h 36m 9s
Radio Santiago	157 740	9127h 49m 22s
TVI	145 940	2591h 44m 33s
RDP Antena 2	115 968	6612h 35m 35s
RTP1	112 617	2428h 33m 18s
RTP MEMÓRIA	110 359	2028h 36m 51s
RDP Africa	95 824	5332h 22m 11s
RTP2	92 338	1823h 53m 27s
PANDA	91 678	1618h 12m 0s
Super Bock Super Rock	89 001	5472h 49m 51s
Festival	87 895	4725h 49m 47s
RDP Antena 1	82 953	4205h 57m 15s
Rádio Sudoeste	79 955	3971h 41m 56s
TSF	78 264	4433h 49m 16s
Radar	69 392	4144h 1m 44s

2.3.6 Rights and repertoire data

A rights-accurate, evidence-based allocation for venue licensing requires that three layers interoperate fluidly: (i) identity and repertoire registries that unambiguously specify who performed and what recording is being remunerated; (ii) the local CMO documentation and distribution system that applies national policy and computes payouts; and (iii) usage-evidence feeds that report when, where, and how much each recording was used in venues and on broadcast media. This triad is

instantiated by the International Performers Database (IPD) and the Virtual Repertoire Database (VRDB) on the registry side, GDA's documentation and allocation workflows on the CMO side, and BMAT as the monitoring and reporting layer.

IPD provides the canonical, cross-society identity layer for performers. It resolves professional names and society affiliations to persistent performer identifiers. In our pipeline, once a usage event is matched to a recording, credited artists are resolved against IPD so that allocation lines accrue to the correct natural individuals.

Where IPD answers who, VRDB answers what. VRDB is the exchange environment for neighbouring rights repertoire, carrying recording identifiers (e.g., ISRC), versioning, and right-line claims used by CMOs to synchronise documentation. After BMAT declares a recording-level match, our workflow validates and enriches that assertion against VRDB (ISRC normalisation, deduplication, and alias reconciliation) before creating or updating the corresponding accounting lines at GDA.

GDA's local documentation and distribution process is the infrastructure where registry information and usage evidence become distribution information. GDA ingests VRDB repertoire updates and IPD performer identities, harmonises domestic submissions, and runs quality controls (including AI-assisted matching, recommendation, and outlier detection) to enhance documentation completeness before applying policy rules to compute distributions.

The choreography and integration of the data from the three information systems allowed the rights and repertoire data to be processed and prepared for the analysis that sustains the Portuguese living lab.

2.3.7 Data processing pipeline

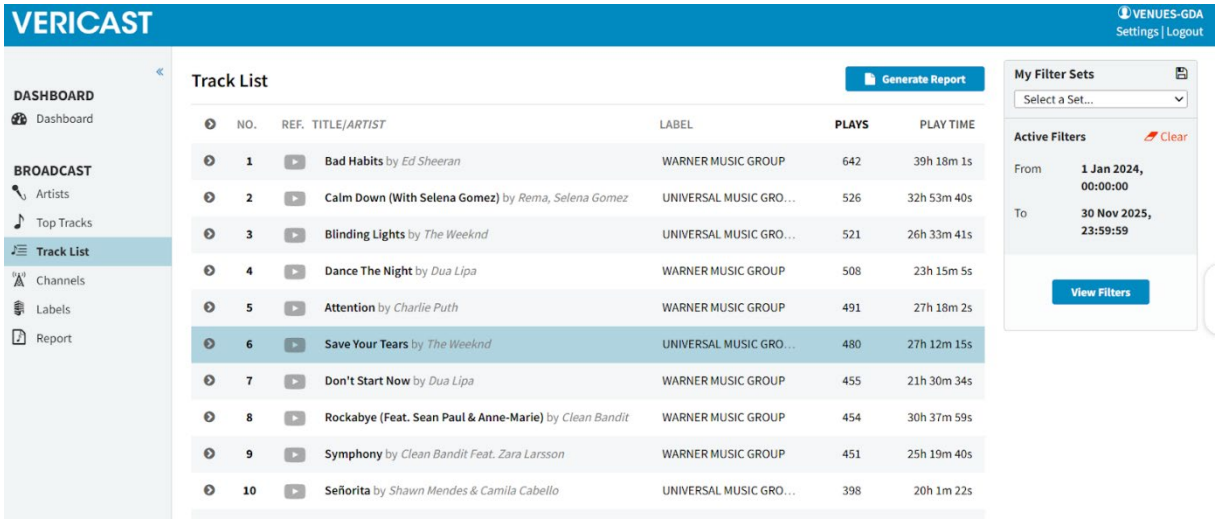
This section outlines the end-to-end pipeline for transforming raw usage detections into analysis-ready, rights-linked datasets, ultimately producing the evidence base for the Portuguese Living Lab's results. The process comprises seven staged components, each with explicit quality controls and auditability.

2.3.8 Evidence acquisition

BMAT continuously monitors two streams of usage evidence: (a) on-site venue monitoring using acoustic sensors and music fingerprinting, and (b) radio/television monitoring across the 29 reference stations. Both streams apply the same identification logic (fingerprinting → matching → metadata

pairing) and deliver time-stamped durations per recording. These reports (c.f. Figure 2.1) form the canonical record of when, where, and how much each recording was used.

Figure 2.1 - Screenshot of the BMAT reporting system



2.3.9 CMO intake, quality assurance, and ETL

Upon receipt, GDA performs a first line of quality checks on the BMAT reports, verifying device uptime, file integrity, time-window plausibility, and identification confidence thresholds, before initiating a predefined ETL (Extract–Transform–Load) workflow. ETL standardises identifiers, harmonises station and venue metadata and computes coverage indicators (e.g., proportion of open hours monitored). The outputs are loaded into an analysis schema with versioned tables for subsequent linkage and modelling.

2.3.10 Preliminary usage analytics (venue vs. broadcast)

With harmonised usage data in place, GDA conducts first-pass analytics to characterise repertoire and intensity patterns by medium: temporal profiles, venue class, station, genre strata, and head/long-tail concentration. These descriptive analyses establish the empirical differences between usage modes (venues versus radio/television), guide later modelling choices (e.g., minimum duration thresholds), and surface outliers for targeted data curation.

2.3.11 Repertoire reconciliation via VRDB (the “what”)

Each recording-level usage event is then validated and enriched against VRDB to resolve the repertoire identity and right-line assertions. This step includes ISRC normalisation, deduplication across versions and releases, reconciliation of title aliases, and confirmation of neighbouring rights lines. Where VRDB

coverage is partial, provisional entries are flagged for editorial follow-up; all transformations are logged to preserve a traceable lineage from raw detection to repertoire record.

2.3.12 Performer contribution analysis (role-aware expansion)

Using the VRDB-confirmed repertoire, GDA expands recordings to performer lines and applies role logic (e.g., featured/non-featured) consistent with national policy. Plays and durations are aggregated to recording and performer-level share vectors, enabling immediate inspection of how differences in usage modes translate into contributors' inferred shares, overall and by role, venue class, genre, and period. This stage yields the first quantitative view of potential distributional shifts when replacing broadcast proxies with venue evidence.

2.3.13 Identity resolution via IPD (the “who”)

Performer lines are resolved against IPD to canonicalise identities (persistent performer identifiers, professional names, affiliations). This enables analysis by nationality, CMO representation, and other cross-border attributes relevant to settlement and policy evaluation. Discrepancies (e.g., aliasing, incomplete affiliations) are queued to GDA’s documentation workflow for curation, ensuring that downstream allocation scenarios reflect up-to-date identity information.

2.3.14 Synthesis, analysis workbooks, and reporting

All linked and quality-assured datasets are compiled into analysis workbooks (reproducible notebooks and tables) that drive the paper’s figures and tables. These workbooks implement the comparative allocation scenarios, the Broadcast-Proxy Model (benchmark) versus the Venue-Evidence Model (counterfactual), and produce the divergence and distributional metrics reported in the results. The final step is preparing the written report.

Together, these stages operationalise the Living Lab’s choreography: BMAT monitors and delivers usage reports; GDA validates and engineers the data; early analytics characterise differences between usage modes; VRDB and IPD ground the what and who of repertoire and performers; GDA assesses implications for performers’ contributions across modes; identity resolution enables nationality/representation analyses; and the integrated outputs are assembled into workbooks that underpin the study’s empirical findings and narrative.

2.4 Analysis & Results

2.4.1 Music Used in Venues

In Table 2.3, we present a set of global descriptive metrics that characterise the music used across the different venues during the analysis period. The metrics presented include the number of sound recordings used, the number of plays, and the distribution of usage of the sound recordings. Regarding the distribution, we would like to highlight the results related to the kurtosis (a statistical measure that describes the shape of a probability distribution, specifically the degree to which data points cluster in the tails versus the centre of the distribution) and the skewness (a statistical concept describing the asymmetry of a probability distribution around its mean) of the distribution. These measures indicate that we are in the presence of a leptokurtic distribution (heavy tails and a sharp peak) with a tail that is longer on the right; most values are concentrated on the left.

Table 2.3 - Global descriptive metrics of the music used in venues

Metric	Value
Total number of sound recordings plays	425 665
Total number of unique sound recordings	46 655
Mean total plays per sound recording	9.12
Standard Deviation	25.94
Maximum number of plays of a sound recording	642
Skewness	6.76
Kurtosis	66.14

In Table 2.3, we present the descriptive metrics of the music used per venue. The descriptive statistics table highlights the quantitative profile of activity per venue, summarising central tendencies, dispersion, and distributional characteristics.

Analysing the top 5 venues by mean activity, we can conclude for each one of those that:

O PREGO DA PEIXARIA:

This venue has the highest average activity (mean ≈ 53.4) and a high standard deviation (σ ≈ 69.1). A moderate positive skewness suggests a right-tailed distribution; most values are lower, with a few

high spikes, and a negative but close to 0 kurtosis indicates a platykurtic distribution. This means that the distribution of music usage in this venue is flatter than a normal distribution, with lighter tails (meaning fewer extreme values or outliers) and a lower, broader peak.

RESTAURANTE ARCADAS O FAIA:

This venue has moderate positive skewness, suggesting a right-tailed distribution; most values are lower, with a few high spikes, and a positive kurtosis below 3 indicates a platykurtic distribution.

DOTE AV IGREJA:

Although this venue has an average activity lower than the above-presented ones (≈ 14.2), it has extremely high skewness (≈ 4.99) and kurtosis (≈ 36). This suggests that the data distribution is highly leptokurtic: long-tailed with heavy outliers.

TR3S LISBOA:

This Venus has a similar profile to DOTE AV IGREJA, but more moderate skew and kurtosis.

MATIZ POMBALINA BAR:

This venue has a much lower variability and flatter distribution (kurtosis < 0). This metric suggests a stable, evenly distributed signal level with fewer outliers.

Table 2.4 - Descriptive metrics of the music usage per venue

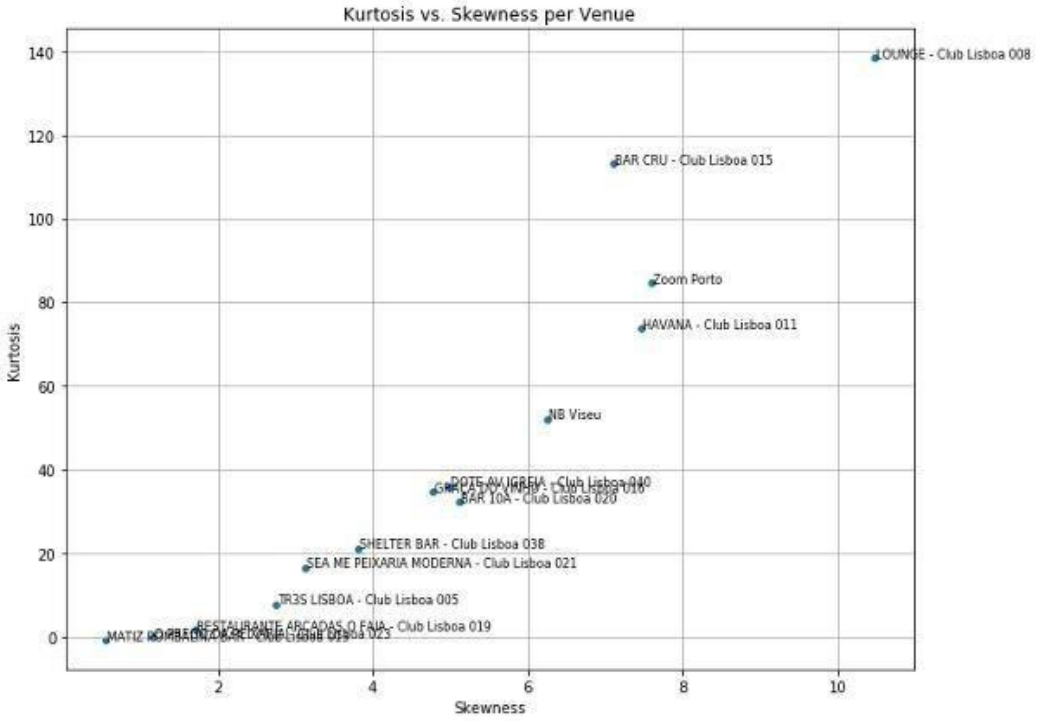
Venue name	~Mean	~Std Dev	Min	Max	~Skewness	~Kurtosis
O PREGO DA PEIXARIA	53	69.12	1	241	1.14	-0.21
RESTAURANTE ARCADAS O FAIA	24	43.64	1	247	1.67	1.74
DOTE AV IGREJA	14	37.95	1	557	4.99	36.01
TR3S LISBOA	14	25.26	1	197	2.75	7.86
MATIZ POMBALINA BAR	12	10.47	1	55	0.55	-0.75
SEA ME PEIXARIA MODERNA	5	6.90	1	112	3.12	16.67
HAVANA	4	12.76	1	224	7.46	73.91
NB VISEU	4	8.97	1	117	6.25	52.18
BAR CRU	4	5.82	1	138	7.10	113.18
ZOOM PORTO	3	5.60	1	91	7.59	84.71

BAR 10A	3	5.61	1	60	5.11	32.25
GRAÇA DO VINHO	2	3.26	1	49	4.78	34.67
SHELTER BAR	1	1.67	1	19	3.80	21.21
LOUNGE	1	2.81	1	48	10.47	138.47

In Figure 2.1, we present, per venue, their position in a two-dimensional space defined by their skewness (horizontal axis) and kurtosis (vertical axis). The skewness of a distribution allows us to measure the asymmetry of the distribution activity. A right-skewed (positive values) indicates that the activity is concentrated at lower values, with a few high spikes. A left-skewed (negative values) distribution, not present in this dataset, would suggest many high values and few low ones. The kurtosis (y-axis) measures the shape of a probability distribution, specifically the degree to which data points cluster in the tails versus the centre of the distribution. The kurtosis of a probability distribution allows us to categorise the probability distribution as (i) mesokurtic (kurtosis ≈ 3): normal distribution baseline; (ii) leptokurtic (kurtosis > 3): heavy tails and sharp peak (more extreme outliers); or (iii) platykurtic (kurtosis < 3): light tails and flatter peak (fewer outliers).

As we can see, most venues fall in the upper-right quadrant (high skewness, high kurtosis), indicating a highly asymmetric distribution of music usage, with rare but extreme use of specific sound recordings. There are only three exceptions in the venues set (*O Prego da Peixaria*, *Restaurante Arcadas O Faia* and *Matiz Pombalina Bar*) that are categorised as having a platykurtic distribution (light tails and flatter peak).

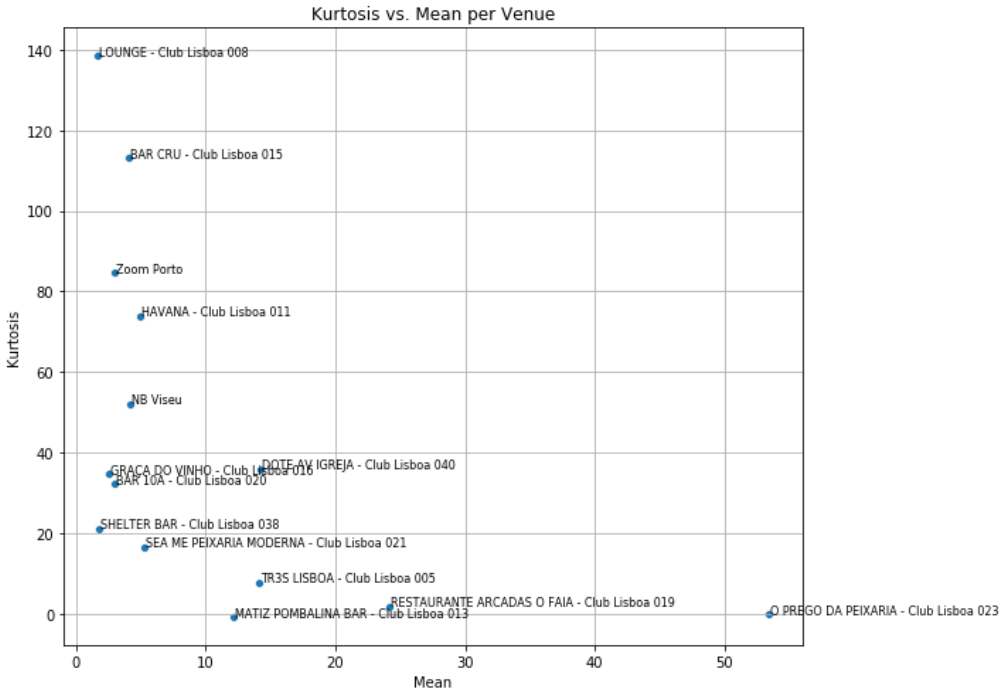
Figure 2.2 - kurtosis vs. skewness per Venue



Another interesting relationship we could extract from the dataset is the relationship between the distribution's kurtosis and the mean value per venue. As it is represented in Figure 2.2, we essentially have two types of behaviours in our dataset: (i) high kurtosis and low mean or (ii) relatively low kurtosis and high mean. In the first group, we can categorise the use of music with minimal repetition of the same sound recording, with rare extreme spikes of intensively used recordings. The second group (high mean with low kurtosis) indicates a high use of each sound recording, with fewer outliers, suggesting a stable usage pattern.

For example, in our venue set, *Lounge* shows moderate means but very high kurtosis, indicating rare but extremely impactful usage of sound recordings, while *Matiz Pombalina Bar* shows moderate means and low kurtosis, indicating steady and stable usage.

Figure 2.3 - kurtosis vs. mean value per venue



We can also see in Figure 2.3 and Figure 2.4 the histogram and the boxplot of the usage sound recordings per venue that essentially confirm the hypotheses derived from the analysis of the kurtosis statistical properties. We have two categories of venues based on how they use sound recordings. The ones categorised by a steady and stable usage with a relevant number of sound recordings being used with the same level of intensity, with rare extreme spikes of intensively used sound recordings, and a second group with consistently high use of each of the sound recordings, with fewer outliers.

Figure 2.4 - Histogram of usage of sound recordings per venue

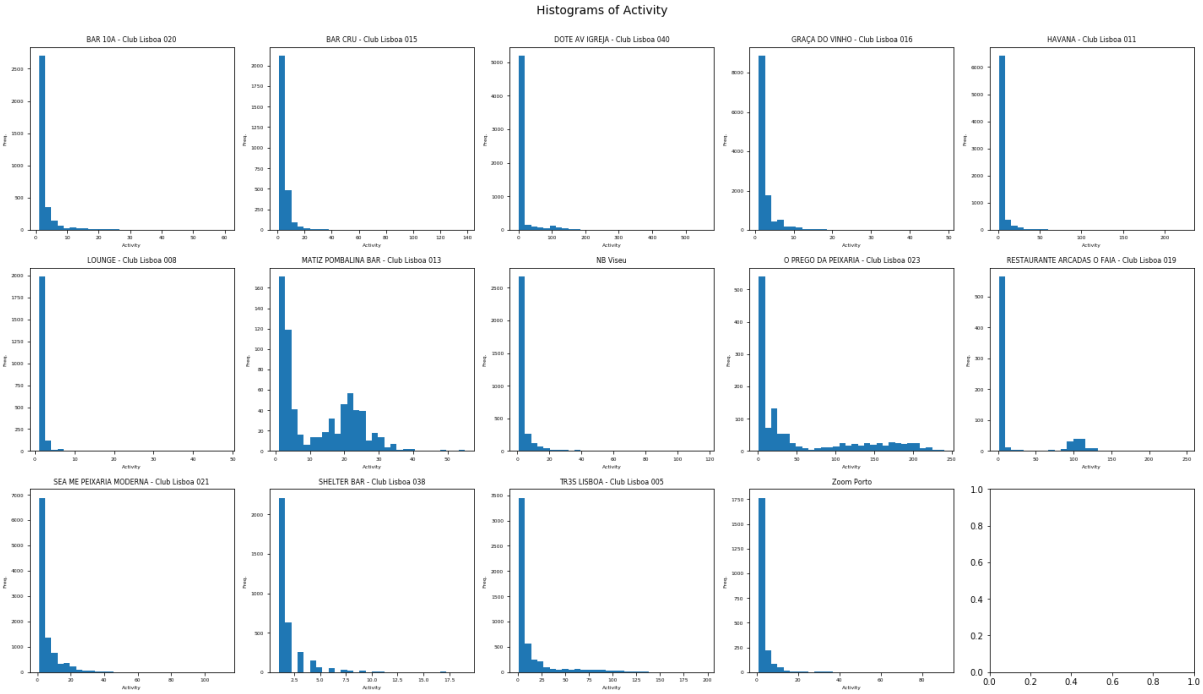
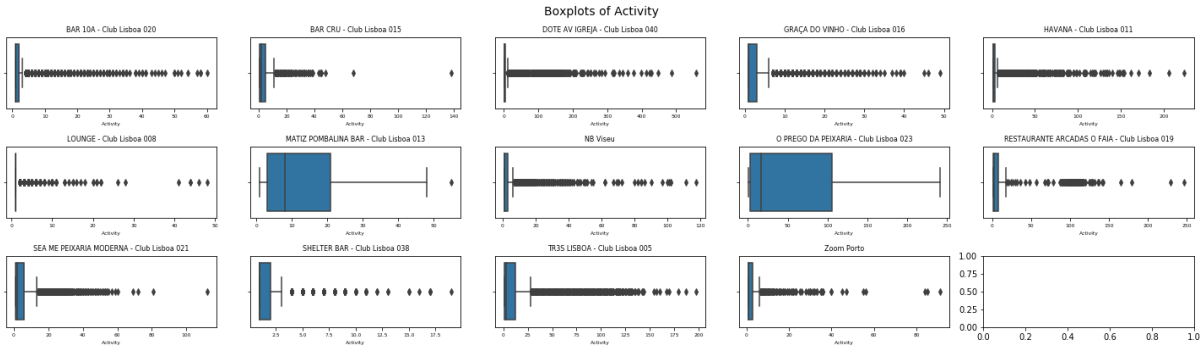


Figure 2.5 - Boxplot of sound recordings usage per venue



The Gini coefficient and the Lorenz curve are formal tools from economic theory and statistics used to quantify and visualise inequality in the distribution of a resource, typically income or wealth, but in our case, we apply them to understand the musical usage across venues. These concepts are closely related: the Lorenz curve provides the geometric representation, and the Gini coefficient quantifies the area between the Lorenz curve and the line of perfect equality.

In Figure 2.5, we present the Lorentz curves for each venue. On the X-axis, we present the percentage of tracks in the population. On the Y-axis, we project the cumulative share of the total activity (e.g.,

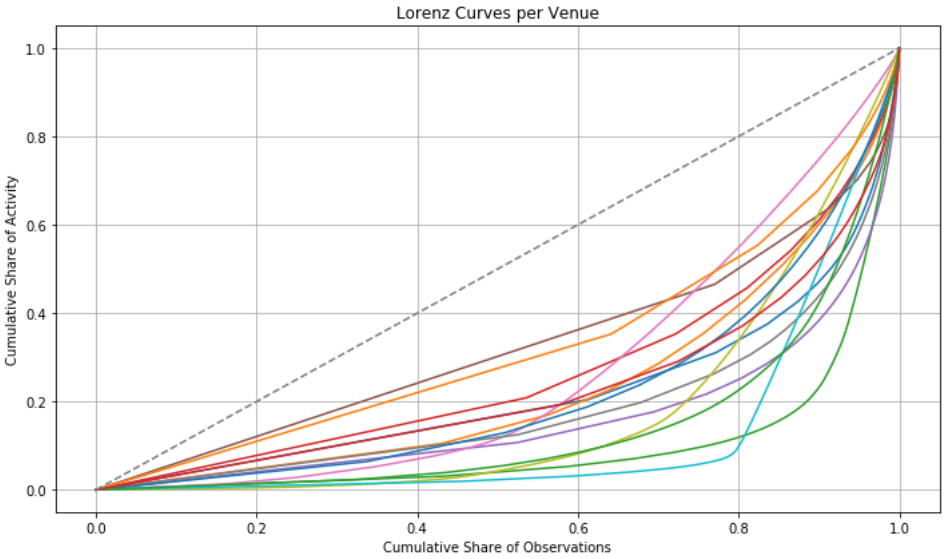
detections, plays). Theoretically, there are two extremes: (i) Perfect Equality: If all elements have equal activity, the Lorenz curve is the diagonal line (also called the “line of equality”) and (ii) Perfect Inequality: If all activity is concentrated in one entity, the curve hugs the X-axis and jumps to 1 at the end. In the first extreme, all sound recordings have the same usage intensity, while in the second extreme, only one sound recording is used.

In our context, we defined the analysis population as the individual sound recordings, and the resource as the number of times a track is used. Thus, a high Gini coefficient implies that few tracks dominate the venue's musical landscape (i.e., repetitive use of specific high-rotation songs). A low Gini coefficient implies that activity is more evenly distributed across a broader repertoire. The Gini coefficients per venue are presented in Table 2.5.

Table 2.5 - Gini coefficient per venue

Venue	Gini Coefficient
DOTE AV IGREJA	0.81
RESTAURANTE ARCADAS O FAIA	0.76
TR3S LISBOA	0.72
HAVANA	0.68
O PREGO DA PEIXARIA	0.65
NB VISEU	0.63
BAR 10A	0.57
SEA ME PEIXARIA MODERNA	0.56
ZOOM PORTO	0.55
BAR CRU	0.54
MATIZ POMBALINA BAR	0.48
GRAÇA DO VINHO	0.467
LOUNGE	0.36
SHELTER BAR	0.35

Figure 2.6 - Lorenz curves per venue



The Theil Index and the Hoover Index are two complementary metrics used to quantify inequality in a distribution, particularly in economic and social sciences. We apply the two indices to our dataset, where the variable of interest is musical activity (i.e., track detections) across venues; these measures provide insight into how concentrated or evenly distributed the content usage is within each venue. A low Theil index implies that tracks at a venue are played with relatively similar frequency. The musical activity is broadly distributed. A high Theil index means that a few tracks dominate the detections, a sign of strong content concentration, perhaps due to repeated use of specific popular songs or DJ/playlist programming choices. In our dataset, a venue can be categorised into one of the three spaces when we project both the Theil and Hoover indices per venue. The quadrant with High Theil and High Hoover implies an extreme concentration. Few tracks dominate, and much redistribution would be needed to equalise activity. Possibly a DJ-style venue or one with automated repetition. In the quadrant with low Theil and low Hoover indices, it would characterise a venue with balanced and diverse usage. Likely indicates ambient/background music or curated variety. And finally, in the divergent value space (e.g., high Theil but low Hoover), we could characterise the venue as skewed but not very concentrated, which might reflect a long-tail distribution of activity (many rare tracks and some frequent ones). In Table 2.6, we present the Thiel and Hoover indexes per venue.

Table 2.6 - Theil and Hoover index per venue

Venue	Theil Index	Hoover Index
DOTE AV IGREJA	1.50	0.70
RESTAURANTE ARCADAS O FAIA	1.24	0.711
HAVANA	1.11	0.55
TR3S LISBOA	0.99	0.58
NB VISEU	0.90	0.51
O PREGO DA PEIXARIA	0.77	0.55
BAR 10A	0.76	0.46
ZOOM PORTO	0.69	0.43
SEA ME PEIXARIA MODERNA	0.57	0.44
BAR CRU	0.55	0.41
LOUNGE	0.45	0.30
GRAÇA DO VINHO	0.45	0.37
MATIZ POMBALINA BAR	0.40	0.39
SHELTER BAR	0.27	0.289

Finally, we end our descriptive analysis of the music used in venues by presenting in Figure 2.6, Figure 2.7 and Figure 2.8 the correlation matrix of the sound recordings used in the different venues. We can conclude that the venues in the monitoring set are not highly correlated, except for one. The low level of correlation on the repertoire used by the venues makes the set a good candidate and a good source of music usage data to complement and to analyse against the reference data model used by GDA to distribute the royalties collected, because the music usage set introduces a divergent and wide pool of music usage information.

Figure 2.7 - Pairwise Correlation Matrix of Venue Activities

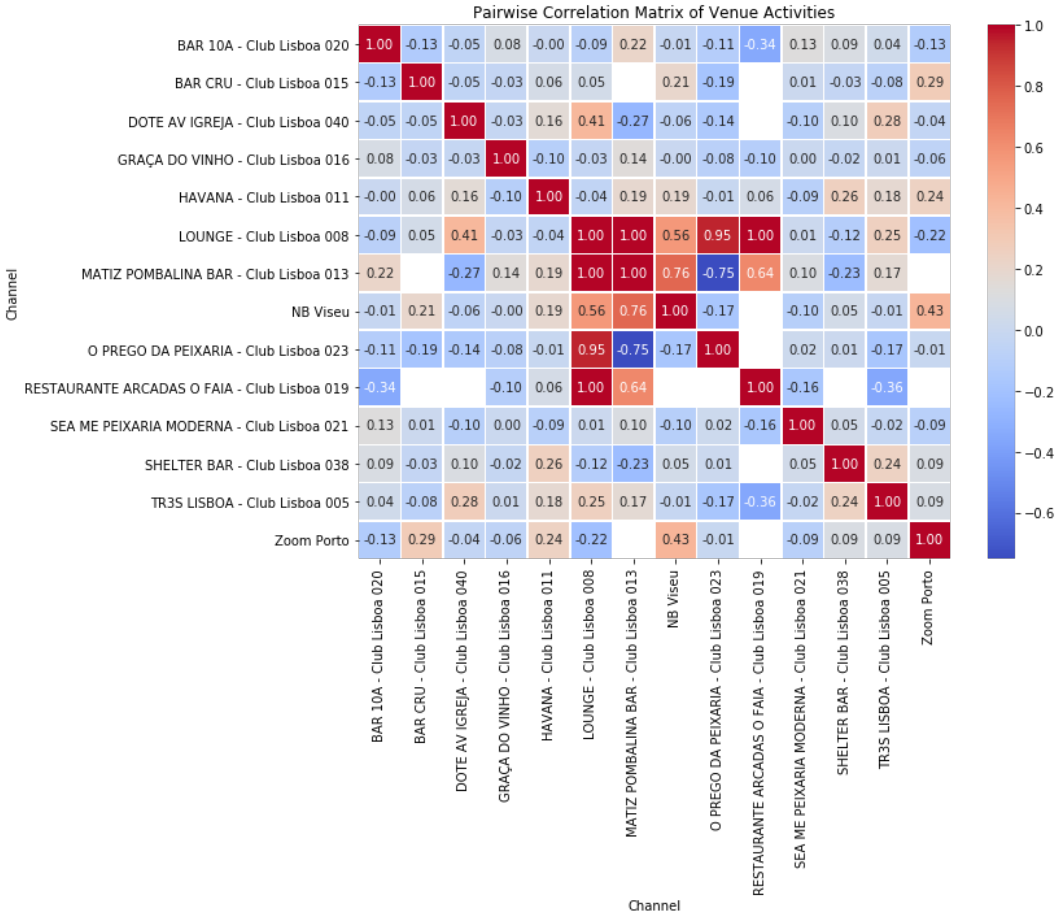


Figure 2.8 - Pairwise Correlation Matrix (Only > 0.1) of Venue Activities

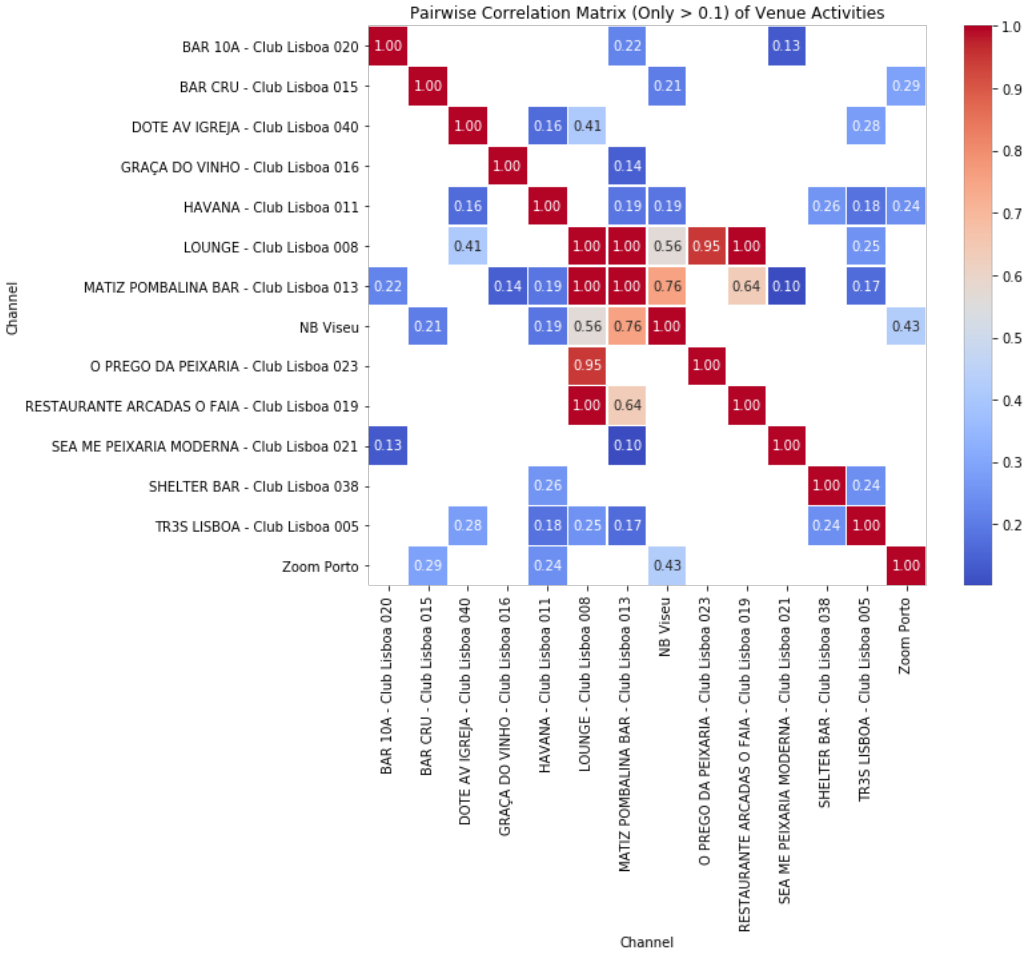
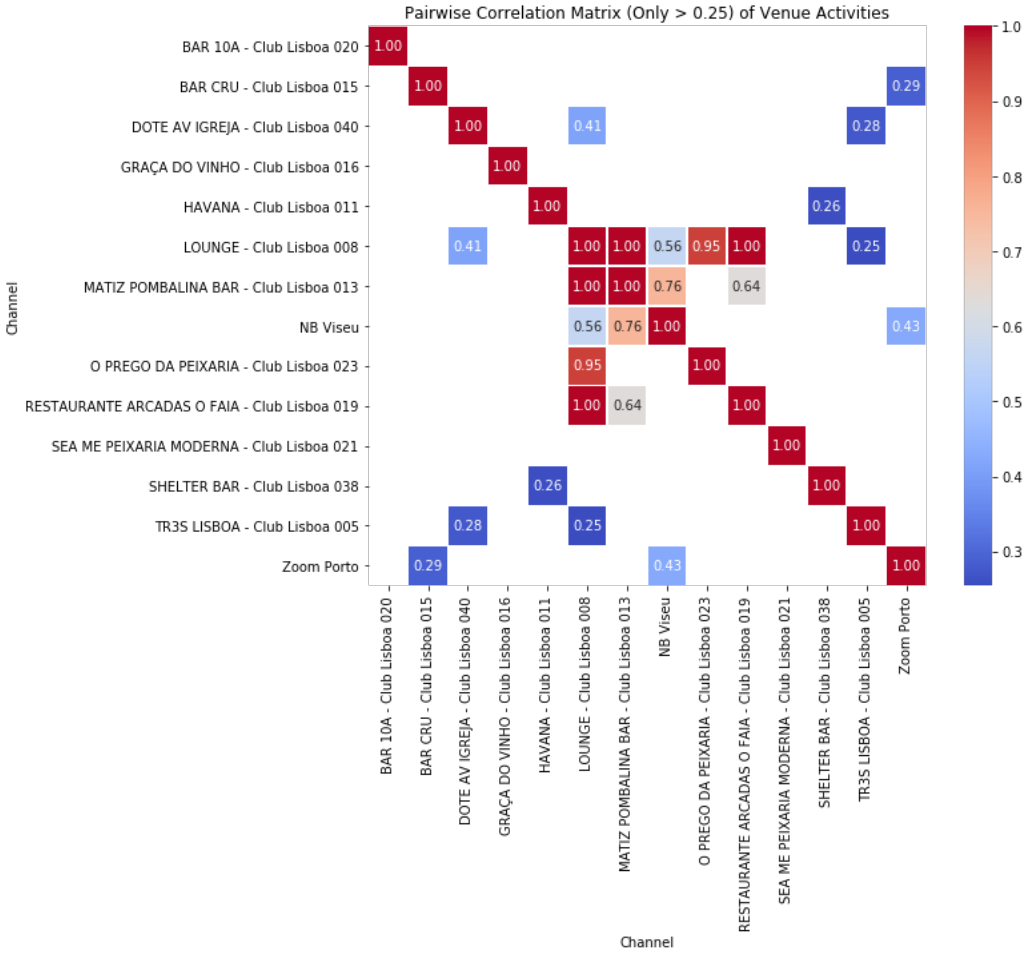


Figure 2.9 - Pairwise Correlation Matrix (Only > 0.25) of Venue Activities



2.4.2 Comparing venues against radios and television

In Table 2.1 and Table 2.2 we introduced the set of venues monitored during this living lab and the list of radio and TV channels that constitute the music usage data sources to build the GDA distribution reference model.

In a first analysis, comparing the two datasets of music usage, we can conclude, based on the key metrics in Table 2.7, that the venues dataset contains 46,655 unique recordings, of which 28,888 (61.95%) were not found in the broadcast dataset (the reference dataset for distribution). Conversely, the broadcast dataset includes 362,283 unique recordings, of which 344,516 (95.1%) were not present in venues. The intersection comprises 17,767 recordings, representing 38.0% of the venue's repertoire but only 4.9% of the broadcast repertoire. Aggregating both sources yields a universe of 391,171 unique recordings (venues-only: 7.39%; broadcast-only: 88.09%; overlap: 4.54%). Usage intensity also

differs; venues account for 420,802 total plays (mean 9.02 plays per unique recording), while broadcasts account for 8,166,794 total plays (mean 22.5 plays per unique recording), indicating substantially higher usage intensity in broadcasts relative to venues.

If we based our analysis solely on the key metrics presented in Table 2.7, we would conclude that the current reference model for distribution is leaving a significant portion of the music repertoire used in venues unrepresented. By stating that only 38% of the recordings used in venues are present in the reference broadcasting dataset, we would clearly underscore a problem with the distribution model.

Table 2.7 - Key metrics music usage venues and radios

Description	Music used in venues	Music used in radios and TV channels
Total number of unique recordings used	46 655	362 283
Total number of unique recordings not found in the other data set	28 888	344 516
Percentage of recordings not found in the other data set	61.95%	95.1%
Total number of recordings in both data sets	17 767	17 767
Percentage of the number of recordings in both data set	38%	4.9%
Total number of plays	420 802	8 166 794
Average number of plays per unique recording	9.02	22.5

When we analyse the music used in both datasets (venues, radios and TV channels), we can clearly identify one interesting and significant fact (cf. Table 2.8), the average intensity of usage (number of times a music is used) in the intersection dataset is very high (165.3 plays per unique sound recording) when compared (cf. Table 2.7) to the average number of plays 9.02 for music used in venues and 22.5 plays for music used in the reference broadcast model. This fact allows us to sustain the hypothesis that although the number of sound recordings in both datasets is relatively small (39%), the recordings shared by both datasets are the ones that have a high level of usage in the venues and are the ones that are more relevant for the distribution to the right-holders.

Table 2.8 - Key metric usage for music used in both venues, radios and TV channels

Description	Music used in venues, radios and TV channels
Total number of unique recordings used in both data sets (intersection of datasets)	17 767
Total number of unique recordings in both data sets (union of datasets)	391 827
% unique recordings (intersection dataset)/ (union of datasets)	4.53%
Total number of plays (union of datasets)	8 592 459
Total number of plays (intersection of datasets)	2 933 602
Average number of plays per unique recording (intersection of datasets)	165.3

Analysing in more detail (cf. Table 2.9 and Table 2.10) the differences in the sub-set of the music used in venues and using as the criteria to divide the music used in venues the condition that it is also (or not) included in the reference broadcast model we can continue to sustain the hypothesis that the recordings shared by both datasets are the ones that have a high level of usage in the venues and are the ones that are more relevant for the distribution to the right-holders. It is significant that, in venues where the music was not detected in the reference broadcasting dataset, 48% of the sound recordings were used only once, and 80% were used less than 5 times.

Table 2.9 - Key metrics for music only used in venues

Description	Music used in venues but not in radios and TV channels
Total number of unique recordings used only in venues	28 888
Total number of recordings used in venues	46 655
Total number of plays for recordings used only in venues	188 294
Average number of plays per unique recording used only in venues	6.51
Number of recordings only used once in venues	14 026
% recordings used only in venues with usage = 1	48.55%
Number of recordings only used <= 5 in venues	23 318
% recordings used only in venues with usage <= 5	80.72%
Number of recordings only used > 5 in venues	5 570
% recordings used only in venues with usage > 5	19.28%

Table 2.10 - Key metrics for music usage used in both venues and radios or TV channels (intersection of datasets)

Description	Music used in venues and in radios or TV channels (intersection of datasets)
Total number of unique recordings (venues)	17 767
Total number of plays for recordings (venues)	237 371
Average number of plays per unique recording (venues)	13.36
Number of recordings only used once in venues	5 561
% recordings only used once in venues	31.47%
Number of recordings used <= 5 in venues	11 594
% recordings used <= 5 in venues	65.26%
Number of recordings used > 5 in venues	6 173
% recordings used > 5 in venues	34.74%

The key finding is that although the number of sound recordings used in venues, and not present in the reference broadcasting model, is high, it is associated with recordings with very low usage (80% with fewer than 5 uses in an 18-month period). The translation of the finding to the distribution of rights logic is that the missing recordings in the reference broadcasting data model are relevant in number but would generate a limited value in the distribution process because the distribution process tries to reflect the usage by not only identifying the recording used in the relevant context but also by proportional assigning the collected values to the intensity of usage (measured as the number of times a song was used or the time it was used).

2.4.3 Inquiry to the users on the sources used for music

A core objective of MUSIC360 is to inform fairer licensing and royalty distribution by understanding exactly what music is played, and how, in real-world settings. As part of this project, an extensive survey (inquiry) was conducted among businesses licensed by GDA and Audiogest to publicly play recorded music, ranging from retail shops and gyms to restaurants and bars, to map out: (a) what sources of music they use (radio, streaming services, background music providers, televisions, CD, or other physical devices, etc.), (b) which genres of music they typically play, and (c) their attitudes toward new usage-based royalty models (for example, whether they find it important that artist payments reflect actual music used, and whether they would like to receive reports on popular music in their sector). In this section of the report, we present an analysis of the inquiry results, providing both quantitative summaries by sector and qualitative insights into music use patterns in public spaces.

Public venues have traditionally paid blanket music licenses without detailed tracking of songs played. The Portuguese Living Lab inquiry aims to better understand how venues select and source their background music. By surveying a representative sample of licensed venues, the goal is to identify which music delivery methods are most common (for instance, do small cafes rely on FM radio or dedicated and curated playlists?), what musical ambiance is preferred in different environments, and how venue owners feel about the possibility of usage-based reporting and remuneration.

2.4.4 Survey Overview and Sector Breakdown

The inquiry achieved a robust response across two major sectors: *Commerce & Services*, which includes retail stores, shopping centres, gyms, salons, and other service-oriented venues, and *Restaurants & Hospitality*, encompassing restaurants, cafés, bars, nightclubs, and related hospitality venues. Table 2.7 below summarises the number of establishments surveyed (“# venues”) and the number of valid questionnaire responses (“# survey”) in each sector, with a further breakdown by sub-category:

Table 2.11 - Survey sample by sector and sub-sector.

Sector (Overall)	Commerce and Services		Restaurants and Similar	
Number venues inquiry database	3,104		5,871	
Total inquiries completed	490		948	
Sub-sectors:	# venues	# survey	# venues	# survey
Retail (shops)	1 343	208		
Sports and Fitness	996	146		
Health and Beauty	459	86		
Customer Service Counter	4	0		
Culture and Entertainment	166	26		
Shopping Center	44	4		
Petrol Station	12	1		
Office	35	11		
Leisure and Cultural	1	0		
Transportation	34	6		
Super Market	5	0		
Educational Institution	5	2		
Restaurants/Snack Bars			3 348	583
Coffee house			909	135
Bars (no DJ)			1 062	162
Bars (with DJ or dance)			489	60
Nightclubs			63	8

From the above, we see that 948 venues in the hospitality sector and 490 in the commerce/service sector completed the survey, for a total of 1,438 completed questionnaires (out of 8975 venues contacted).

About one-third of the total responses (490) came from the venues categorised as *Retail & Services*. Within it, retail stores formed the largest subgroup (208 responses), followed by gyms/sports clubs (146) and health/beauty businesses (86). Fewer responses came from cultural venues, transport facilities, etc. This distribution roughly mirrors the population of licensed establishments; retail is the dominant music user in the commerce segment.

Nearly two-thirds of the responses (948) came from venues categorised as *Restaurants & Hospitality*. Restaurants (including snack bars) were the single biggest category, accounting for well over half of these responses (583). Cafés and bars without DJs also had substantial representation (135 and 162 responses, respectively). In contrast, nightlife venues like dance clubs were few (only 8 nightclubs responded, reflecting that there are fewer licensed nightclubs overall). Bars that feature DJs or dance floors also constituted a small fraction (the survey indicates 60 responses combined for those).

The high response rate from restaurants and retail shops is unsurprising; these types of venues are ubiquitous and often play music regularly to enhance the atmosphere. In the analysis that follows, we'll often compare trends across the Commerce/Retail and Restaurant/Bar sectors to see how their music usage practices converge or differ.

2.4.5 Music Sources: How Public Spaces Get Their Music

One of the central research questions addressed in the survey was, "Which of the following sources are used in your establishment to play music?" Respondents could select multiple sources if applicable. The options included: radio, television, streaming platforms (e.g. Spotify, YouTube), specialised ambient music services (e.g. Waybox, Mood Media), local audio files (e.g. CDs or MP3 playlists), or other (to capture things like live DJs or custom setups).

Overall, the two most prevalent music sources were streaming services and plain radio. Streaming (such as Spotify or YouTube) was reported by 55% of the venues (789 venues) as a part of their music usage pipeline. Meanwhile, about 41% of the venues (589) indicated they use terrestrial or internet radio broadcasts in some capacity. Television audio (playing music video channels, news, or sporting events) was also highly common; roughly 20% of establishments had TVs playing with sound, especially in bars, cafés, and gyms. On the other hand, more curated solutions were less widespread: only a small minority (4%) subscribed to dedicated background music services like Cognitive or Waybox (66 venues). A modest share of 178 venues (12%) relied on local media (CDs/MP3s) or self-made playlists on a physical device to play music, though many of these often used such files in combination with other sources.

To illustrate typical usage, here are some examples from the responses:

A small boutique retail shop might simply tune into FM radio for background music. Indeed, many store owners cited playing a popular station (e.g., *Rádio Comercial*) throughout the day. This was particularly common in the Commerce/Services sector – e.g., *Sapataria Steps*, a shoe store, reported using radio (*Comercial* and *M80*) as their source.

A café or casual restaurant often prefers streaming playlists. For instance, *Café O Trovador* uses Spotify for a jazz/blues mix, and Restaurante Aroma D uses YouTube to play jazz/blues as background music. These streaming setups allow fine control over mood (which many owners evidently take advantage of by choosing "Chillout" or other mellow genres).

Many bars and gyms use a hybrid: Spotify streaming plus TV audio or radio as needed. For example, *Bar LionHeart* indicated they use both Spotify and TV, likely streaming music most of the time but occasionally turning on sports or music channels. A fitness club (*CrossFit Salvictus*) uses Spotify for workout commercial music. This mixing of sources is common. A bar might stream music but also keep a TV on mute with sports visuals, or vice-versa (play TV music channels but switch to a Spotify playlist).

Only a handful of venues rely on speciality B2B music services. For example, a national gym chain location (*Fitness Factory Valongo*) reported using Waybox (a curated music provider), and a fashion retail store mentioned using Mood Media in-store service. These cases are the exception; most prefer consumer streaming apps over paid commercial music services. These detected behaviours raise some sensitive questions, especially because the consumer streaming apps are not licensed by the rights holders and exclude in their service terms and conditions the use of music to publicly communicate music in venues.

The "Other" category captured some unique cases: a few nightclubs simply replied "DJ" (indicating live DJs as a primary source), and one fast-food franchise noted "playlist do próprio grupo", meaning their corporate HQ provides a playlist. A children's playcenter noted "música infantil via app" (children's songs via a phone app). These bespoke setups underscore that for a small subset, custom solutions are used, but on the whole, the standardised options (radio/streaming/TV) dominate.

In conclusion, streaming and broadcast radio emerge as the pillars of background music in public spaces, with television a close third.

2.4.6 Musical Genre Preferences Across Venues

In the inquiry, we asked, “Which of the following musical genres best reflects the music heard in your establishment?”, allowing multiple choices. This reveals the atmosphere each venue seeks to cultivate and is also a key indicator of the repertoire that should be included in the distribution process to ensure a minimum level of representativeness. Clear patterns emerged: venues gravitate toward a consistent set of genres for background music. In Table 2.8, we can see the number of venues that reported using music by genre.

Table 2.12 - Music used in venues by genre

Music Genres	Number of venues
Pop	682
Rock	461
Chillout	385
Jazz / Blues	210
Hip-Hop / Rap / R&B	125
Tradicional / Popular	99
Classical / Erudite	75
House / Techno / Trance	55
Forró / Samba	51
Kizomba / Semba	40
Reggae	39
Folk/Indie	31
Funk/Soul	31
Country	17
Salsa / Merengue e similares	16
World music	15

"Pop" and/or "Rock," the all-purpose choices: Across almost all venue types, the broad categories of Pop and Rock were among the most frequently selected. Pop music, being familiar and melodic, is a safe background choice; it was cited by coffeehouses, clothing stores, supermarkets, and gyms alike. Classic rock or soft rock oldies were also commonly mentioned, especially in bars, pubs, and some retail shops. For example, an apparel boutique *Black Cat* noted rock music in its mix, and *Café Central da Mealhada* listed classic rock among its staples. The ubiquity of Pop and/or Rock suggests that these genres form a neutral, cross-demographic backdrop.

"Chillout", the modern lounge ambience: Interestingly, Chillout music (downtempo, mellow electronic/lounge) was among the most popular specific genres mentioned, especially in restaurants, spas, and upscale retail. Nearly 30% (385 venues) of all respondents included "Chillout" as a descriptor. For instance, *Restaurante Pausa Simbólica* plays chillout tracks, and many cafés (e.g., *Sweet & Salt Cafe*) and hotel bars do as well. Chillout's prominence shows that instrumental, easy-going music is in high demand as background music.

Jazz and Soul: Jazz/Blues and related Soul/Funk tunes were another favourite, appearing in about 15% of venues' reported playlists (228 venues). For example, *Botanique* plays funk/soul and traditional/popular music, and many high-end eateries, like *A Cozinha das Marias*, have a jazz/blues background. Light jazz provides an upscale, soothing ambiance, which explains its strong showing.

Dance/Electronic genres: Venues with more energetic environments, gyms, nightspots, some bars, frequently ticked genres like House, Techno, Trance (club music). Overall, around 3% (55 venues) chose some form of electronic/dance music. As expected, nightclubs like *Discoteca Palace Kiay* marked electronic ("house/techno") as their mainstay, and fitness clubs often play upbeat dance for workouts.

Traditional, World, and niche genres: Several respondents included local or niche genres that cater to specific audiences or themes. For instance, Fado (traditional Portuguese music) appeared in some restaurant playlists. Latin music (Salsa, Merengue, etc.) was cited by venues such as dance studios and Latin bars. Hip-Hop/R&B was present in many gym and youth-oriented spaces. *Hyve Fitness* listed hip-hop and R&B on their gym playlist. A yoga studio or spa might mention "Relaxing/Instrumental" (one spa wrote "música relaxante"). Essentially, beyond the core mainstream genres, there is a rich tail of specialised genres: from Reggae at a surf bar, to Classical/Erudite music at an upscale restaurant or bookstore, to "80s music" for nostalgia (indeed, several respondents wrote in "Música anos 80" as a category). These choices reflect venues aligning their music to specific brand identities or customer preferences.

Overall, there is a clear preference for familiar, soothing, or upbeat music rather than very aggressive or avant-garde styles. Genres like metal or hardcore techno were almost absent. Instead, most businesses converge on a middle ground of pop/rock, smooth electronic, and easy-listening genres that create a pleasant environment. The precise mix varies by venue type: retailers lean towards pop and light radio hits, restaurants lean towards jazz, chillout, and softer world music, bars and gyms include more rhythmic and high-energy genres, while cafés and spas favour mellow instrumentals. But nearly all avoid music that could be distracting or divisive. As one respondent noted, their goal is to play “músicas comerciais” (popular commercial songs) that most customers recognize.

Finally, it’s worth noting that most venues selected multiple genres, indicating variety. A typical restaurant might tick “Jazz, Chillout, Pop” altogether, covering different times of day or a blend of styles. This suggests venues often curate a mix rather than sticking strictly to one genre. The MUSIC360 data thus highlights not only the most common genres but also the typical diversity in a single venue’s playlist.

2.4.7 Attitudes on Remuneration and Reporting

Two important attitudinal questions were included in the survey:

Q: “Do you consider it important that the royalties paid to producers and artists reflect the music actually used in your establishment?” (i.e., usage-based remuneration).

Q: “Would you like to receive reports or aggregated data about the most-played music in your sector?”

These questions gauge receptiveness to the core ideas behind MUSIC360’s envisioned system (a system where actual usage data might inform royalty distribution, and possibly be fed back to users as insights). The responses were recorded as “Yes (Sim)”, “No (Não)”, or sometimes “Maybe (Talvez)”.

The findings show a generally positive outlook on usage-based fairness, but a more cautious stance toward receiving reports:

An overwhelming majority, 80% (1149 venues), answered “Yes”, they agree it is important that what they pay in licensing correlates with the music they actually play. Venue owners clearly find the principle of fairness appealing. For example, a restaurant that mostly plays jazz and pop felt that artists in those genres should benefit from their fees, rather than have fees distributed irrespective of actual use. Only a small minority (around 15%, corresponding to 230 venues) responded “No” to this question, often accompanied by comments suggesting they feel the current system is fine or that it

isn't feasible to track every song. But overall, it's evident that most businesses support a usage-tailored remuneration model. This is an important validation for the MUSIC360 stated objectives.

The enthusiasm for receiving Music Usage Reports was more limited. Only about 21% (313 venues) answered "Yes" that they would like to receive such aggregated reports. For example, a small café owner might not find value in a report of the top 10 songs played in all cafés nationally (indeed, one respondent commented they "wouldn't know what to do with that information"). On the other hand, those who said "Yes" often noted curiosity or a desire to stay informed of trends. Some who responded "Maybe" wrote that they would be interested if the reports were easy to understand and relevant to them. But demand for analytical reports was generally lukewarm. This suggests that while businesses want fairness (as seen in the first question), they do not strongly demand the analytical feedback for themselves. Likely, their primary concern is practical rather than intellectual curiosity about music data. This information could also indicate that the impact of music in the business of the different venues is not necessarily perceived or understood.

Venues support the principle of aligning fees with actual music usage, validating one of MUSIC360's key premises about perceived fairness. At the same time, most do not feel a personal need for receiving usage reports or charts, meaning any reporting tools the project provides might see limited voluntary uptake. There were a few exceptions, e.g., managers of large chain establishments or those with a keen interest in music trends did express interest in reports (some even wrote that such data "could help in choosing playlists" or marketing), but these were not the norm.

2.4.8 Comparative Insights: Commerce/Services vs. Restaurants/Bars

Bringing together the above aspects, we can draw some comparative insights between the *Commerce & Services* sector (retail shops, offices, gyms, etc.) and the *Restaurants & Hospitality* sector regarding music use:

Generally, in retail and services, music tends to be more of a background ambient factor, whereas in hospitality (food & beverage), it's a more conscious part of the guest experience. This is evidenced by genre and source choices. For example, a boutique shop might just keep a radio station on (ambient, low effort), while a trendy café is more likely to curate a Spotify playlist of indie/jazz tunes to craft a specific vibe. Similarly, many retail venues chose very neutral genres (pop, soft rock, no strong preference), whereas restaurants often put more emphasis on stylistic consistency (e.g., a sushi bar playing chillout and bossa nova to create a lounge atmosphere, or a theme bar playing only 80s hits for nostalgia). This indicates that restaurants and bars use music more deliberately as a branding element, whereas retail stores often treat it as pleasant filler sound.

As noted above, a few retail chains use licensed ambient music services, whereas among standalone restaurants, this was virtually non-existent; they prefer consumer streaming or their music libraries. So, adoption of B2B music services is currently more on the retail side, though overall low.

Regarding remuneration fairness and reports, there was, interestingly, no divergence between sectors. Both sectors' respondents overwhelmingly said "Yes" to the importance of usage-based payment. As for receiving reports, neither sector was particularly keen, but anecdotal evidence suggests that restaurant/bar owners were slightly more interested in music trend reports than retail owners. A few bar owners said they'd love to see what songs are hits elsewhere (which might help them keep customers engaged), whereas most shop owners did not see added value. This aligns with the earlier notion: hospitality folks are more invested in music as part of the business, so they find that data more intriguing than a retailer who might not change anything based on a report.

In summary, while commerce and hospitality venues share many common practices (Spotify and radio rule, pop music everywhere), they differ in the degree of curation and genre flavour. Restaurants and bars treat music as a more integral part of ambience, leading to higher streaming use and more adventurous genre mixes, whereas retail and service businesses tend to stick to crowd-pleasing radio hits and simple setups. Both sectors, however, exhibit a desire for fairness in licensing, indicating broad support for MUSIC360's push toward usage-based distribution of royalties.

2.4.9 On the declared radio stations' usage in venues

For venues that declared the use of radio stations in their licensing process, we inquired about their radio station usage. In Table 2.9 we present the radio stations used as declared by the users. Two elements are worth mentioning. First, the usage of radio stations in venues is highly concentrated in a few radio stations. We just need 5 radio stations to cover more than 80% of all radio-mentioning events, and the 2 stations with the most mentions account for 60% of those events. Secondly, 92% of all radio-mentioning events are associated with radio stations in the GDA distribution reference radio set (cf. Table 2.2). The set of radios mentioned in the radio-mentioning events and not part of the GDA distribution reference radio set are under the general denominations "local radios", "non-Portuguese online radios", and "online Portuguese radios". The exceptions are *Radio Oxigenio* (9 radio-mentioning events) and *Radio Marginal* (4 radio-mentioning events), *Hiper FM* (6 radio-mentioning events), *Radio Nova* (3 radio-mentioning events) and *Radio Observador* (1 radio-mentioning event).

The fact that the radio usage in venues is highly concentrated on a small subset of radios makes the distribution of rights generated by the radio usage of music in venues easily aligned with the reference distribution model of Collective Management Organisations.

Table 2.13 - Radio stations used in venues

Radio station	Number of Venues	% of radio stations mentioning
Radio Comercial	336	34,46%
RFM	258	26,46%
M80	118	12,10%
CIDADE FM	52	5,33%
Smooth FM	37	3,79%
Local Radio	36	3,69%
Mega Hits	25	2,56%
Radio Renascença	19	1,95%
Non-Portuguese online-radio	16	1,64%
Antena 3	13	1,33%
Nova Era	10	1,03%
Oxigénio	9	0,92%
Antena 1	7	0,72%
Hiper FM	6	0,62%
Orbital	5	0,51%
Batida FM	4	0,41%
Marginal	4	0,41%
Radar	4	0,41%
Radio Amalia	3	0,31%
Rádio Nova	3	0,31%
TSF	3	0,31%
Antena 2	2	0,21%

On-line Portuguese radio	2	0,21%
Radio Observador	1	0,10%
Vodafone Radio	1	0,10%

2.5 Conclusion

The Portuguese Living Lab provides the first comprehensive, evidence-based assessment of background-music use in public venues in Portugal, demonstrating both the feasibility and the analytical value of integrating direct venue monitoring into rights-distribution frameworks. By combining venue fingerprinting, detailed broadcast datasets, and rights-accurate repertoire, this study empirically validates the MUSIC360 premise that fairer, more representative distributions require moving beyond proxy-based models and toward granular, in-venue measurement.

The analysis of usage patterns across the 14 participating venues reveals that repertoire usage is highly heterogeneous, with pronounced skewness, heavy-tailed distributions, and limited cross-venue correlation. This heterogeneity itself provides critical evidence: venues rely on distinct repertoires that are only partially reflected in the national broadcast ecosystem. While the broadcast dataset is far larger in overall repertoire size and intensity, the venue-level data captures a complementary musical landscape, including long-tail and context-specific recordings not visible in traditional reference models.

Yet the Living Lab also uncovers an important moderating insight. Although 62% of the recordings used in venues do not appear in the broadcast reference, the vast majority of these unmatched tracks exhibit very low usage intensity, 80% are played fewer than five times across 18 months. Conversely, the intersection between venue and broadcast datasets, though comparatively small in cardinality, contains the most intensively used repertoire (in venues), with an average of more than 165 plays per recording. From a distribution-impact perspective, this indicates that while proxy-based broadcast models miss in part the long-tail repertoire, the highest-value recordings (in terms of usage intensity) are represented in both datasets. This effect explains why current distribution practices, despite their limitations, tend not to diverge dramatically from usage-based allocations in aggregate, even if they fail to reflect venue-specific repertoires in detail.

The user survey reinforces the empirical findings. Venues overwhelmingly rely on streaming services and radio as their primary music sources, reflecting a mix of curated and passive programming.

Musical preferences cluster around mainstream, atmosphere-driven genres (pop, rock, chillout, jazz), corroborating the patterns observed in the fingerprinted usage data. Critically, 80% of respondents strongly support the principle that royalties should reflect the actual music used in their establishments, indicating high perceived fairness in MUSIC360's evidence-based approach. Conversely, the limited interest in receiving analytic usage reports suggests that stakeholders prioritise fairness in distribution over data feedback or operational insights for their own decision-making.

Taken together, these findings demonstrate that the Living Lab model is both operationally feasible and strategically valuable. It provides a scalable method for measuring real-world usage, correcting systematic biases inherent in broadcast-only proxies, and quantifying the distributional consequences of transitioning to evidence-based models. At the same time, the results highlight that the practical impact of such a transition will depend on how CMOs choose to balance distribution costs, representativeness, administrative complexity, and policy goals. The evidence suggests that hybrid approaches, retaining broadcast references for high-rotation repertoire while incorporating venue data to capture long-tail and sector-specific usage, may offer an optimal path forward.

Lastly, the Portuguese Living Lab demonstrates that a fairer, usage-aligned distribution framework is not only conceptually desirable but technically implementable. The Living Lab provides a robust empirical baseline for evaluating alternative allocation models, informing tariff justification, and supporting MUSIC360's broader ambition to align value flows with the actual cultural and economic role of music in everyday public life. Future phases will build on this foundation by expanding venue cohorts, refining modelling techniques, and deepening the integration between usage evidence, repertoire registries, and rights-distribution policies.

2.6 References

International Federation of the Phonographic Industry. (2025). *Global Music Report 2025*. IFPI.

3 2025 Irish Living Lab

Lisa Ní Choisdealbha, Irish Music Rights Organisation (IMRO), Dublin, Ireland

3.1 Context & Summary

The 2025 Irish study set out to deepen our understanding of the impact of music on customer experience, employee experience and commercials within a variety of bar and restaurant venues in Dublin city. From our 2024 study, we already knew the key role that music plays in these venues, for customers, employees and commercials; and while we build on that in 2025, we also extended the variety of establishments to investigate the role of music from a brand perspective.

The key questions of this work were to understand;

- How music is curated
- The role of music in commercial success
- Its impact on productivity in the workplace and simultaneously on customer retention and advocacy

3.2 Methodology

The 2025 Irish study again engaged a partner hospitality group who operate several venues across Ireland, spanning a varied of venue types and appealing to a range of customer cohorts. We reached out to a proportion of these venues, setting up in-person, on-site meetings with management and staff. Having spoken to individuals within each of the establishments, we then validated findings with a Group representative, to overlay that central perspective. The study included 9 interviews during April and May 2025.

All venues are located in central Dublin and span a range of themes, appealing to a variety of audience types. The venues partaking were:

- Venue 1: The George, described as a 'party the moment you walk through the door', the George is a well-known gay bar and nightclub, with a clientele of all ages, and a strong party atmosphere from evening to late.
- Venue 2: NoLiTa, a contemporary restaurant, bar and nightclub. While the restaurant serves a range of bite-size options to full multi-course New York-Italian food, and the bar/ nightclub offer live and recorded music; the venue caters to individual and group bookings, throughout the week.
- Venue 3: Café en Seine is a restaurant and cocktail bar, open from 11:30 7 days a week. A large venue in the centre of Dublin, it caters to more discerning clientele, predominantly female, offering an extensive dining experience, a host of bars, as well as extensive cocktail and wine menus.
- Venue 4: Whelan's is one of Dublin's iconic music venues, with a heritage spanning over 30 years, open from 5pm to late, 7 nights per week. The venue consists of 3 parts, including a

private function room, large live area and a street-level bar. Whelan's is famed for offering new and established acts on a regular basis, as well as 'discovering' many of Ireland's top talents as they emerge.

3.3 Analysis and Results

3.3.1 Context and Key themes

It is clear from this research that music plays a central role in creating the ambience, defining the brand and contributing to commercial success within the hospitality setting. The venues we spoke to recognise the central role of music in delivery of their product, and articulation of that role varies from being an overt differentiator to a more subtle supporter of the brand. In each case, however managers take the role of music very seriously, managing music strategically, curating it to align with customer expectations and drive customer behaviour and the application of music to drive staff productivity.

3.3.2 Strategic Music Management

All venues carefully curate music, with commercial intent at the ownership group who recognise the role of music in curating each venue's brand and associated customer expectations of music in each venue. Music helps establish unique venue identities and different music styles help venues target specific customer demographics.

Music significantly shapes the venue's atmosphere, with different styles used strategically throughout the day to match different times of day, customer demographics, and business objectives. Typically, venues play relaxed jazz during mornings and as background music, moving to more upbeat tracks in evenings.

Music is viewed as a commercial asset that influences customer behaviour and spending. Faster, more vibrant music encourages customers to be more active, happier, and potentially stay longer and spend more. At Whelan's, they noted this happens naturally when the right music is playing. Cafe en Seine adjusts music tempo based on venue busyness, with more upbeat music during peak hours.

Music helps establish unique venue identities. Whelan's positions itself as supporting independent, original live music across three different capacity venues, while NoLiTa features live shows with DJs, bongo players, and saxophonists that customers specifically seek out.

While maintaining core brand identity, venues strategically experiment with new music to expand their appeal. The George has successfully introduced Brazilian carnival music, while Cafe en Seine mentioned upcoming events with an Italian DJ and potential jazz nights as experiments to attract new

audience segments while staying true to their brand positioning. These strategies demonstrate how venues thoughtfully align their music selection with their brand positioning and target audience to create distinctive experiences that drive commercial success.

3.3.3 Customer Expectations, Behaviour and Spending

The range of customer segments have distinct music expectations, and faster, more vibrant music encourages customers to be more active, happier, as well as potentially stay longer and spend more. All venues noted that this happens naturally when the right music is playing, and the venues adjust music tempo based on venue busyness, with more upbeat music during peak hours.

At Whelan's, audiences 'know exactly what they are coming for' with regard to music. The George noted that customers often comment on music before even entering the venue and 'dance in the door', showing its importance in their decision-making.

Music often encourages customers to stay longer. When the music stops, customers typically recognise it as a signal to leave, with some even requesting specific songs to extend their stay.

3.3.4 Staff Experience and Performance

Music significantly impacts staff mood and productivity. Staff at multiple venues reported that music affects their energy levels and work pace, with faster-paced music often helping them work more efficiently during busy periods. Some staff even dance behind the bar, finding music a positive influence on their work environment. And while the right music can help staff stay motivated and work faster, especially during busy periods, certain songs can become repetitive for them over time.

At The George, staff members provide feedback on the music played, with some nights being more critical than others. There's recognition that staff preferences for music can sometimes clash with what's best for customers, requiring careful monitoring to balance these needs.

3.3.5 Music Adaptation and Flexibility

Each of these successful venues constantly monitor crowd reactions and adjust music accordingly. DJs at NoLiTa tailor music to crowd response, and The George regularly updates playlists to keep them relevant. Cafe en Seine's in-house DJ creates playlists specific to different days, times and seasons; and all venues' DJs monitor popular music trends to ensure that playlists are kept fresh and relevant to their clientele.

3.3.6 Live Music as an Experience Driver

Beyond background music, live performances create distinctive experiences and are regularly cited as drivers of certain crowds at certain times or days of the week. Live performances (bands, DJs, saxophonists) create unique experiences that customers specifically seek out. Cafe en Seine features live bands on Sundays, while NoLiTa incorporates various live performers alongside DJs on weekends, creating experiences customers specifically seek out.

3.3.7 Focus area 1. How Music is Curated

While the venues in our study are centrally owned, the group's owners highlight that each of the venues in our study are quite individual, with distinct personalities and brands. Thus, no central music policy is applied and venues curate their own music, within the venue's broader brand guidelines, and often with the support of a group-procured DJ provider. These venues use several approaches to curate music, adapting to different times of day, space usage (restaurant/ bar/ nightclub), customer demographics, and venue purposes.

3.3.8 Segmentation by Time and Space

Venues strategically segment their music selection based on time of day and physical spaces to match different audience expectations. Cafe en Seine divides their venue into three distinct areas (restaurant, bar, and late-night club), each with tailored music: background jazz or French music in the restaurant, beat music in the bar, and upbeat music at night. This approach allows them to serve multiple target audiences within the same venue. The George follows a similar time-based strategy, playing Spotify playlists in the early evening and transitioning to more energetic music later at night. And while daytime/ early evening music is deliberately more background-oriented, late-night music encourages dancing and socialising. At the George, the music is always familiar, easy to engage with and fun. This contrasts with segmentation at Whelan's where the live-music venue has built a reputation on the quality of new and established live music performers; thus, socialising can at times be a secondary activity for its customers.

3.3.9 The Role of DJs in Music Curation

Most venues we spoke to rely heavily on a DJ curated music selection, allowing the venues choose from a list of pre-selected music for different times of the day, as well as different genres of music to suit their clientele, season, and the evolution of music tastes with time. As Dublin's self-proclaimed

'home of music', Whelan's has more discretion around what is played at the venue than other venues in the group.

DJs used at the majority of these venues are sourced through a centralised DJ provider. In requisitioning a DJ for their venue, a manager will typically meet with the DJ provider, with a brief for the music they need, outlining their target clientele's needs, likes and dislikes, as well as the role of music in the venue and an overview of the venue's brand positioning. A DJ will then be employed on a trial basis before being confirmed to the position both as a regular venue DJ and to create (and update) playlists for the venue.

'DJs at the venue are long-term residents who understand the clientele and adjust the music accordingly' (NoLiTa).

3.3.10 Genre Selection by Venue Type

Music venues like Whelan's focus on independent, original live music with a focus on alternative and rock music. As a renowned live music venue, Whelan's are necessarily selective about performers, and note that they turn down about 70% of performance applicants.

Other venues we spoke to use Spotify playlists until 9pm (The George) or 10pm (Café en Seine), The music then evolves depending on the venue brand and clientele, with Café en Seine moving to a DJ set with upbeat though often familiar music, while The George moves to live drag shows with lip syncing to the music and a strong party influence.

3.3.11 Audience Feedback Integration

Venues actively incorporate customer feedback into their music strategy. The George noted that customers are vocal about their music preferences, often commenting on the music as they enter or leave. This feedback loop helps the venue continuously refine their playlists to match audience expectations. Whelan's, meanwhile, takes a more selective approach, trusting their judgment to curate the venue's music selection (live and recorded) to maintain their reputation for quality alternative and rock music. The Whelan's audience 'knows exactly what they are coming for', due to the venue's music heritage and unique brand position on the Dublin music scene, setting the stage for strong alignment between music selection and target audience expectations.

3.3.12 Adaptive Programming

Each of the venues we spoke to adjust their music programming based on audience composition, evolving music tastes and seasonal trends. Both Cafe en Seine and NoLiTa noted an increasingly diverse cultural range of clientele as Dublin's population becomes progressively multicultural, and both have responded to that evolution. Both have gradually adapted their music selection to accommodate different musical tastes while maintaining their brand identity. Meanwhile, Whelan's and the George modify their live band bookings and musical line-up according to tourist seasons and festivals, recognising that different times of year attract different audience segments, with The George particularly noting the important association that they have with Dublin Pride and the role their parade float, with its music and party atmosphere as a highlight of the festival parade, typically followed around the streets by thousands.

3.3.13 Technology and Control Systems

Venues are adopting technology to manage music more effectively. NoLiTa uses the Q Sing app, allowing managers to raise and lower volume remotely, while other venues employ centralised music selection systems. While staff typically discuss the music tone, pace and volume over headsets, it is Managers who have ultimate decision-making influence. Remote adjustment technology allows for easier adjustment based on crowd reactions and time of day.

3.3.14 Focus area 2: The Role of Music in Commercial Success

While not overtly measuring the impact of music on commercial success, each of the venues we spoke to were quite clear on its role and influence on brand positioning, reputation and sales. As we have discussed, music is carefully curated at a strategic and operational level; and both of these considerations underpin the application and management of music to drive commercial success for hospitality venues on a daily basis.

3.3.15 Brand Reputation

Music plays a crucial role in establishing brand identity and this is recognised both at Group and individual venue level. The central Group team are very aware of the role of music in delivering the brand. As a result, there is no central music policy, and each venue management team has discretion to select music appropriate to their brand and customer. That said, Group representatives typically inject direction on site visits if they notice volume too loud or inappropriate language in the venue's

music, noting 'If the volume is too loud while I'm having lunch or music has bad language in it… it's just not on brand for someone spending €40 on a main.'

At Cafe en Seine and NoLiTa, where the clientele are typically older and female (c. 70%), a variety of music is played in specific areas (restaurant, bar, late-night) to create distinct atmospheres that align with the venue's brand positioning as a versatile destination. Meanwhile, The George deliberately chooses more commercial music over dance and techno to attract a drinking crowd rather than a drug crowd. This strategic decision has directly impacted their brand positioning and target audience.

Group representatives note that for each venue, the music has to answer; 'does it look and feel and sound right for the customer experience and for the brand… for what we are selling?'

3.3.16 Sales Impact

There is a clear relationship between music and sales performance, with staff noting that 'Everything must support what we're trying to sell.'

Venues note that when serving food, the volume and tempo must be at a certain level and contain nothing that might offend clientele, whereas at The George, 'it's a party the minute the door opens!'.

Management at NoLiTa have observed that appropriate music helps create a good atmosphere, encouraging customers to stay longer and spend more. The venue adjusts music throughout the day to match customers' energy levels and the crowd's expectations. When asked directly about whether vibrant or louder music increases spending, Whelan's noted that this happens naturally without forced efforts - they focus on quality music and the commercial success follows.

3.3.17 Customer Retention

Music significantly affects customer retention. At The George, customers often comment on the music before even entering the venue, and staff are very aware of the importance of music in clients' decisions to stay. While operating off a Spotify list during the daytime, the George regularly update this playlist to keep it relevant and customer-oriented. NoLiTa, meanwhile, note that music helps create an environment where customers want to stay longer; so customers who arrive to a dinner booking may choose to stay well into the evening for a live performance and even to the venue's closing. Thus, music allows the venue (and similarly in Café en Seine) to offer multiple music experiences within a single venue; appealing to larger groups with various interests as well as to couples and small groups who are looking for variety within a single night out.

3.3.18 Customer Advocacy

Music plays a role in creating memorable experiences that customers want to share. Venues like Whelan's have built their reputation on quality music, attracting interest from musicians of note worldwide, often looking to play the venue while visiting Ireland; indicating strong word-of-mouth advocacy. And similarly, the party atmosphere invoked by music at The George positions it as a 'go-to' location for fun, relaxation and enjoyment.

3.3.19 Focus area 3: Impact of Music on Staff Productivity in Venues

Music impacts staff productivity across these hospitality venues in two distinct ways; amplifying the energy and thus pace of work; and impacting staff mood. While music generally contributes to staff morale and creates a positive work atmosphere, its direct impact on productivity is also related to factors like customer volume and venue busyness.

3.3.20 Energy & Work Pace

Music tempo directly affects staff energy levels and work pace. At Cafe en Seine, staff often request faster-paced music during busy periods to match the venue's energy and busyness.

If working at a time when no customers are present, some staff use earbuds to play high energy music, knowing it will enable them complete their tasks faster, with one employee sharing that she listens to Brazilian funk in the mornings, to stay motivated and work faster, noting that that faster music helps her reduce a 60-minute task by 10 minutes. And all staff commented that time moves differently when music is faster versus slower.

Yet, while music clearly influences staff energy and mood, one manager noted that overall productivity correlates more with customer volume than music selection; and that louder music is typically associated with louder clientele volumes also.

3.3.21 Mood and Customer Interactions

Music affects staff mood, which in turn influences staff interactions with customers. Some staff note that higher volume music makes them more energetic, even affecting their work pace and customer interactions.

'Staff enjoy the music and sometimes dance behind the bar, finding it a positive influence on their work.'.

At Whelan's, where music orientation plays a role in staff recruitment, staff typically enjoy the bands that play there, which contributes to a positive work environment. However, management note that certain bands can affect staff mood and productivity, particularly when staff get tired of hearing the same songs repeatedly or where covers are played rather than the musician's original work.

3.3.22 Balancing Staff & Customer Music Preferences

These venues employ several strategies to balance staff music preferences with customer experience, and venues like Café en Seine and NoLiTa use playlists that are managed by the venue's senior staff. At The George, however, there is a clear recognition that staff and customer preferences can sometimes clash. Management actively monitor this tension, prioritising customer preferences while still considering staff input. They update Spotify playlists regularly to keep them relevant and customer-oriented, but also select DJs based on their understanding of what customers want to hear. This creates a system where staff can provide feedback on music, but the ultimate decisions are made with customer experience as the priority.

NoLiTa takes a more centralised approach, with music selected by Group-endorsed DJs. Staff have limited control over specific songs but can choose from pre-selected music for different times of the day and music genres. This structure helps maintain consistency in the customer experience while still giving staff some flexibility. The venue uses technology (an app called Q Sing) to manage volume, making it easier for staff to adjust music based on crowd reactions without changing the overall music selection.

As a dedicated music venue, Whelan's have different playlists for different times of the day to match energy levels and crowd expectations. Most staff are music enthusiasts themselves, which naturally aligns their preferences with the venue's focus. They have more control over music selection compared to other venues in the group. The venue keeps volume at background levels early in the day and adjusts as the night progresses, with staff monitoring crowd reactions to make these adjustments.

Cafe en Seine employs an in-house DJ who creates playlists according to time of day and day of the week. Staff can request faster-paced music during busy periods, and these requests are often accommodated if they align with the venue's atmosphere goals. The owners have specific preferences (music with lyrics), which influences the overall direction, but day-to-day adjustments are made based on both staff input and customer reactions. They recognise the need to refresh playlists periodically to prevent staff fatigue from repetition while maintaining the expected atmosphere for customers.

Across all venues, there is a common understanding that while staff preferences matter for morale and engagement, the customer experience ultimately takes precedence in music selection decisions.

3.4 Conclusion

When it comes to hospitality, as was discovered in Ireland's first Living Lab, music is a key contributor to the brand, personality, commercials and customer experience; and importantly to the employee experience at work. Music factors both at a strategic and operational level, in terms of creating and maintaining that connection to the people in the venue, whether customer or employee, and in optimising their experience to increase satisfaction, dwell time, spend and loyalty. Music's contribution to brand advocacy is also clear, as we see through this research the nature of customer engagement with music across the venues.

And music must be maintained to be continually fresh while still familiar; at the right pace and tempo and at the appropriate volume. While curated playlists are typically updated on a 2-3 month basis, staff, and particularly management are acutely aware of the importance of matching the music to the clientele to create an appropriate atmosphere that re-enforces the brand, driving commercial success in the immediate and longer term.

4 Dutch Living Lab

Ingmar Leijen, Vrije Universiteit Amsterdam, The Netherlands

Sander Teekens , SENA, The Netherlands

Frank Lucassen, BUMA, The Netherlands

4.1 Introduction

When customers walk into a store, whether it is a supermarket, clothing retailer, or drugstore, they are typically encountering background music filling the space. Background music is a key element of the *servicescape*, defined as the physical setting and surroundings that impact customers and employees (Bitner, 1992), shaping the overall customer experience (Mari & Poggesi, 2013; Gupta & Verma, 2021). Prior research has shown that background music can influence customers in several ways, including their satisfaction, how long they stay in stores, and how much they spend (Garlin & Owen, 2006). With music being a tool that is easy to implement and adjust, it is important that retailers fully understand its impact in order to effectively enhance their customers' shopping experience.

Background music may shape consumers' experiences and behaviors in different ways. For example, prior studies have explored whether the presence of music alone affects behavior (Ahlbom et al., 2023), as well as how characteristics such as volume (Garlin & Owen, 2006), mode (Knoferle et al., 2012), and genre (Esfidani et al., 2022) influence the in-store experience. One musical feature with somewhat contradicting findings is music *tempo*. Early research suggests that slower tempo music encourages customers to stay longer in stores and thereby boosts sales (Milliman, 1982; Knoferle et al., 2012). Yet, these findings have not been consistently replicated (Herrington 1996; Sullivan, 2002). To address these mixed findings, the first aim of this research is to provide a more robust examination of music tempo in retail by conducting the largest real-world field study on this topic to date, complemented by a more fine-grained experimental set–up.

Moreover, while existing literature has primarily focused on customers, another critical group impacted by the servicescape has been largely overlooked in both the research on music more generally and music tempo in particular, namely: employees. In service settings characterized by frequent employee-customer interactions, employee attitudes and behaviors play a pivotal role in shaping the customer experience. For example, empirical research by Wolter and colleagues (2019) demonstrated that increases in employee satisfaction significantly enhance customer satisfaction and drive intentions to revisit the store in the future. Given the impact employees can have on customers' shopping experience, it is essential to consider how background music influences not only consumers

but also the staff who are continuously exposed to it throughout the workday. Unlike customers, whose exposure to in-store music is brief and voluntary, employees are exposed to the music played in stores for extended periods (Skandrani, et al., 2011). Accordingly, the second aim of this research is to investigate the impact of music tempo on both customers and employees. This dual focus allows for a more comprehensive understanding of how background music impacts the broader dynamics of the retail servicescape.

4.2 Conceptual background

4.2.1 The effect of background music in retail

A growing body of research has explored how background music influences customers in retail environments. Existing studies have examined various musical elements, including volume, mode, genre, music–store fit, and tempo, and how these shape key outcomes such as emotional states, perceptions of time, money spent, and evaluations of the store itself (e.g., Garlin & Owen, 2006; Knoferle et al., 2012; Michel et al., 2017).

For example, lower volume levels have been associated with customers spending more time in-store (Garlin & Owen, 2006), while familiar or well-liked music tends to enhance consumers' affective states (Knoferle et al., 2012). Moreover, North and Hargreaves (1998) examined the impact of music genre and found that classical music increased customers' willingness to pay, presumably by enhancing perceptions of quality. Additionally, the perceived fit between music and retail brand can shape customers' evaluations, with mismatches between music and brand undermining brand perceptions (North et al., 1999; Vida, 2008). For example, in a field study, North and colleagues (1999) demonstrated that playing French rather than German music in a wine store significantly boosted sales of French wine. Among these musical dimensions, *tempo* has attracted particular interest as well, and is the central focus of the present research.

4.2.2 Music Tempo and the Customer Experience

Tempo reflects the speed of music measured in beats per minute (BPM). Music tempo has been shown to affect customers in various ways. For example, faster-tempo music can increase arousal levels (Garlin & Owen, 2006), while slower-tempo music can make time feel as though it is passing more slowly (Michel et al., 2017). Additionally, tempo does not appear to influence customers' awareness of the music being played (Milliman, 1982). Whereas most research focused on how music impacts customers' emotions and perceptions, some researchers have taken a closer look at how music tempo may influence a retailer's turnover.

Early findings suggest that slower music may lead customers to move through stores at a slower pace, allowing them to see more products and therefore spend more (Soh et al., 2015; Milliman, 1982). However, subsequent studies could not consistently replicate this effect, failing to show that music tempo does not influence overall turnover (e.g., Herrington & Capella, 1996; Sullivan, 2002). These inconsistent findings may be a result of three methodological limitations:

First, several studies examining the effect of music tempo on sales have relied on relatively small sample sizes (e.g., 140 customers in Herrington & Capella, 1996; 62 customers in Caldwell & Hibbert, 2002), which may limit the interpretability and generalizability of their findings. Second, previous research often compared only fast and slow music without clearly defining tempo ranges or including a medium-tempo condition to distinguish the two more precisely (e.g., Milliman 1982). Third, existing studies have examined customers as a homogeneous group (e.g., Knoferle et al., 2012; Sullivan, 2002), overlooking potential differences across customer types which may explain when and why music tempo influences customers shopping behavior. The current research addresses all of these limitations.

4.2.3 Music Tempo and Employees

While the effects of music tempo on customers have received considerable attention, much less is known about how it influences employees, who are continuously exposed to in-store music throughout their shifts. Given that music can affect a person's emotional state (e.g., Knoferle et al., 2012), it may also influence employees' emotions and, in turn, their overall satisfaction at work. Maintaining job satisfaction is crucial from a retailer's perspective, not only because it significantly impacts employees' well-being (Ray, 2021), but also because it helps them endure stressful work periods (Paillé, 2011), affects the quality of their performance (Bitner, 1990; Rogers et al., 1994), and enhances their interactions with customers (Wolter et al., 2019). Yet, the impact of music – and music tempo in particular – on employees emotional state at work has received little attention.

There is reason to believe that both faster and slower tempo music could have beneficial effects on employees' affective states and, by extension, their job satisfaction. On the one hand, prior research shows that fast music is perceived as more pleasant by customers (Anwar et al., 2020), and the same may be true for employees. Additionally, a study by Daunfeldt et al. (2021) found that employees who were allowed to choose the music played in stores tended to select faster tracks, suggesting a general preference for listening to faster-tempo music at work. On the other hand, slower music has been shown to have a more relaxing effect (Biswas et al., 2019) and may be less mentally fatiguing over extended periods of time. This could support more stable affective states and, in turn, enhance job

satisfaction among employees. Yet, the impact of music tempo on employees' emotional states and job satisfaction remains unexplored, despite employees' central role in creating positive service encounters for customers.

4.3 Research objective and research questions

Building on prior literature, this research has three key objectives. First, it aims to provide a more robust and fine-grained examination of how background music tempo influences customer behavior in retail, particularly with regard to store turnover. While past studies have suggested that slower music may lead to increased time spent in-store and higher sales, findings have been inconsistent and often based on limited sample sizes and loosely defined tempo manipulations. To address these limitations, this research involves the largest real-world field study on this topic to date, incorporating a more precise manipulation of tempo using three BPM conditions (i.e., slow vs. medium vs. fast).

Second, the study investigates whether the impact of music tempo on turnover varies depending on the type of customer, and specifically, their level of engagement with the store. Prior research suggests that slow music may increase sales by encouraging customers to move more slowly through a store (Milliman, 1982; Knöferle et al., 2012). If this mechanism holds, the effectiveness of tempo should depend on customers' engagement with the store: slowing down foot traffic should only enhance sales if customers are already interested in the products. Loyal customers, who typically show greater interest in the store and its offerings and are more inclined to explore new products and promotions (Meyer-Waarden, 2008; Grewal et al., 2004), may therefore be more susceptible to the effects of music tempo. We investigate the extent to which the effect of music tempo on turnover depends on customer engagement by distinguishing between customers with a membership card and those without.

Third, the research expands the scope of inquiry to include employees, an essential yet underexplored group within the servicescape. Specifically, it examines how music tempo may impact employees' affective states, job satisfaction, and customer orientation. Moreover, his research explores whether music tempo exerts a serial influence on employees' mood at work, which may in turn shape their satisfaction.

Based on these objectives, the study addresses the following research questions:

1. How does music tempo influence store turnover?
2. Do the effects of music tempo on store turnover vary depending on customer engagement with the store?
3. How does music tempo influence employees' affective states and, in turn, their job satisfaction?

4.4 Methodology

4.4.1 Experimental Design

For this study, a one-factorial between-subjects design was used including three conditions: slow tempo vs. medium tempo vs. fast tempo. The playlists were provided by a professional background music company. On average, the slow music condition had a BPM (i.e. Beats per Minute) of 100 (SD: 18.80), the medium condition a BPM of 113 (SD = 11.75) and the fast condition a BPM of 122 (SD = 13.71).

4.4.2 Materials and Procedure

One hundred forty-nine Dutch stores of a beauty retailer participated in this study. To ensure that the stores assigned each of the three conditions were similar in terms of their revenue and store characteristics, a stratified sampling method was employed. Specifically, an equal number of stores belonging to the same store type (i.e., high traffic, local core, premium, regional core) was assigned to each of the three conditions. Additionally, an equal number of stores with similar revenue based on the turnover of the same period of the previous year was assigned to each condition using a re-randomization approach. Finally, the mean difference scores of the stores across the three conditions were close to 0, suggesting that the stores were similar in revenue, and the findings could not be explained by pre-existing differences in revenue. Based on these procedures, an equal number of stores was assigned to each of the three conditions ($n_{slow} = 50$, $n_{medium} = 49$, $n_{fast} = 50$).

Six sales-related measures were provided by the retailer itself, including overall turnover, turnover for members of the loyalty program, turnover for non-members and average transaction value (ATV; defined as the average amount of sales per customer). Moreover, employees were sent a questionnaire following the experiment asking several questions about their experience during the 2 weeks of the experiment.

Specifically, employees' job satisfaction during the period of the experiment was measured using three items (e.g., "Would you recommend your job to a friend who is looking for one?"; 0 = "strongly disagree" – 101 = "strongly agree"; $\alpha = .89$) adapted from Christen and colleagues (2006). Moreover, affect was measures by asking employees how they have felt during the past two weeks at work by means of the following sliders: (1) 0 = "nervous – 101 = ""at ease", (2) 0 = "angry" - 101 = "calm", (3) 0 = "bored" - 101 "enthusiastic", (4) 0 = "tired" - 101 = "energetic", (5) 0 = "unpleasant" - 101 = "pleasant", ($\alpha = .91$).

Additionally, we also measured three constructs focused on employees relation to their customers: i) Customer-oriented behavior (COB), ii) Customer interaction quality (CIQ), and iii) employees anticipations of customers' emotions. COB was measures using three items (e.g., "my colleagues and I always try to solve the customers' problems"; 0 = "strongly disagree" – 101 = "strongly agree"; ", (α = .87)), adapted from Löhndorf and Diamantopoulos (2014). CIQ was measured was measured using three items (e.g., "I have good customer contact in our store"; 0 = "strongly disagree" – 101 = "strongly agree"; (α = .93)), adapted from Chen & Li (2021). Finally, anticipated customer emotions were measured by asking employees how often they noticed the following emotions in their customers in store "positive", "cheerful", "negative", "stressed" (0 = "never"; 101 = "always"; adapted from Falter & Hadwich (2020)). We averaged the two positive emotions ($r = .580$, $p < .001$), as well as the two negative emotions ($r = .652$, $p < .001$) for the analyses.

Finally, while the previous measures did not explicitly refer to the music played in stores, employees were asked several questions at the end of the questionnaire asking them more openly about how they felt about the music that had been played. These measures included music awareness ("To what extent were you aware of the music that was played in the store over the past few weeks?"; 0 = "not at all aware - 101 = "very much aware"), pleasantness ("Did you find the music in the store pleasant over the past few weeks?"; 0 = "not pleasant at all" - 101 = "very pleasant"), mood impact ("What effect did the music in the store over the past few weeks have on your mood?"; 0 = "very negative" – 101 = "very positive"), store fit ("To what extent did you find the music played over the past few weeks appropriate for [insert store name]?"; 0 = "not at all" – 101 = "very much"), and perceived music energy ("How would you describe the music that was played in the store over the past few weeks?"; 0 = "relaxing" - 101 = "energetic").

4.5 Analysis and Results

4.5.1 The Influence of Music Tempo on Turnover

After removing outliers, 134 stores were included in the analyses. Tables 4.1 and 4.2 provide an overview of the means of all sales variables per condition as well as the comparisons between conditions. Specifically, table 4.1 shows that neither turnover, nor transactions vary depending on the music tempo played in stores. Moreover, taking a closer look at the contrast effects between specific conditions (table 4.2), we find that no differences in any of the sales variables exist.

Table 4.1 Means and Standard Deviations and ANOVA of Turnover and Transactions per Condition

Variable	Means and SDs			Univariate ANOVAs	
	Slow	Medium	Fast	F	p
Overall Turnover	452.45 (207.21)	432.58 (189.72)	445.86 (172.41)	.125	.883
Member Turnover	414.20 (179.51)	396.11 (163.03)	412.12 (153.13)	.157	.855
Non-member Turnover	883.07 (628.72)	849.07 (571.29)	824.96 (515.13)	.118	.889
Transactions	502.37 (223.31)	502.37 (223.05)	472.52 (199.61)	.251	.778

Note: Turnover values indicate a derived score rather than real turnover rates. ***p < .001, **p < .01, *p < .05

Table 4.2 Pairwise Mean Differences Between Conditions for each Sales Variable

Dependent Variable	Contrast	Mean Difference (SE)	*p*-value
Overall Turnover	Slow vs. Medium	19.87 (40.40)	.624
	Slow vs. Fast	6.59 (39.93)	.869
	Medium vs. Fast	-13.27 (40.62)	.744
Member Turnover	Slow vs. Medium	18.09 (35.16)	.608
	Slow vs. Fast	2.08 (34.75)	.952
	Medium vs. Fast	-16.01 (25.15)	.651
Non-member Turnover	Slow vs. Medium	33.55 (121.36)	.783
	Slow vs. Fast	58.11 (120.36)	.630
	Medium vs. Fast	24.56 (122.42)	.841
Transactions	Slow vs. Medium	29.90 (42.16)	.490
	Slow vs. Fast	20.13 (42.66)	.639
	Medium vs. Fast	-9.73 (43.39)	.823

Note: Turnover values indicate a derived score rather than real turnover rates. ***p < .001, **p < .01, *p < .05

These results remained when replicating the analysis with log-transformed variables due to a high variance found in all measures. Moreover, the results also remained when controlling for turnover from the previous year during the same period of the experiment and when controlling for store type. To test for further robustness of our effect, we also conducted a difference-in-difference analysis, which allows to consider pre-existing differences between conditions before the experiment. The findings also remained in this last robustness check.

Thus, contrary to previous research suggesting that slow music increases store turnover compared to fast music (Soh et al., 2015; Milliman, 1982), the current findings show that music tempo, and slow tempo music in particular, does not impact store turnover (Research Question 1). Moreover, no differences were found depending on the customers' engagement with a store, since both the member, as well as non-member related turnover did not differ between conditions (Research Question 2).

4.5.2 The Influence of Music Tempo on Employees' Perceptions

One hundred one employees with an average age of 37 (*SD* = 13.16) participated in our online survey (females = 134, males = 4, non-binary = 1, prefer not to day = 1). Table 4.3, 4.4 and 4.5 provide insights into the relation between the measures variables across conditions, as well as an overview of the means of all employee variables per condition as well as the comparisons of these variables between conditions.

Table 4.4 indicates that job satisfaction and affect (i.e., employees' emotional state at work) throughout the experimental period varied significantly depending on the type of music that was played. Additionally, customers' positive emotions as anticipated by employees also varied depending on music tempo. Table 4.5 offers deeper insights into which conditions exactly differed from one another in terms of job satisfaction, affect and customer emotions. Specifically, slow tempo music lead to significantly higher job satisfaction compared to medium tempo music, and to marginally higher job satisfaction compared to fast tempo music. Moreover, employees' affect at work was more positive when slow as compared to medium and fast music, while no difference was found between medium and fast tempo music. Additionally, in line with employees own emotional state, employees also anticipated customers positive emotions to be highest when slow as compared to medium or fast music was played, while no difference exists between medium and fast tempo music.

Table 4.3 Correlations of all Employee Variables

		1.	2.	3.	4.	5.	6.
1.	Job Satisfaction	1					
2.	Affect	.63***	1				
3.	Customer-oriented behavior	.39***	.28***	1			
4.	Customer interaction quality	.61***	.54***	.64***	1		
5.	Customer emotions positive	.13 (NS)	.38***	.07 (NS)	.30***	1	
6.	Customer emotions negative	-.318***	-.436***	-.06 (NS)	-.25***	-.29**	1

***$p < .001$, **$p < .01$, *$p < .05$

Table 4.4 Means and Standard Deviations and ANOVA of Employee Variables per Condition

Variable	Means and SDs			Univariate ANOVAs	
	Slow	Medium	Fast	F	p
Job Satisfaction	86.69 (11.05)	78.93 (15.44)	81.02 (22.62)	2.351	.099

Affect	84.32 (14.48)	76.17 (16.83)	76.43 (21.44)	2.876	.043
Customer-oriented behavior	94.63 (7.42)	92.91 (8.13)	93.09 (16.15)	.296	.744
Customer interaction quality	91.15 (10.51)	87.21 (10.58)	87.17 (18.78)	1.171	.313
Customer emotions positive	76.52 (13.02)	69.26 (12.99)	69.50 (21.97)	2.65	.074
Customer emotions negative	30.16 (20.84)	36.04 (20.50)	31.69 (22.55)	.839	.435

Note: All constructs were measured on a scale of 0-101. ***p < .001, **p < .01, *p < .05

Table 4.5 Pairwise Mean Differences Between Conditions for each Employee Variable

Dependent Variable	Contrast	Mean Difference (SE)	*p*-value
Job Satisfaction	Slow vs. Medium	7.76 (3.73)	.039*
	Slow vs. Fast	5.56 (3.63)	.120
	Medium vs. Fast	-2.10 (3.70)	.571
Affect	Slow vs. Medium	8.15 (3.91)	.039*
	Slow vs. Fast	7.89 (3.80)	.040*
	Medium vs. Fast	-.26 (3.85)	.946
Customer-oriented behavior	Slow vs. Medium	1.72 (2.48)	.490
	Slow vs. Fast	1.54 (2.41)	.526
	Medium vs. Fast	-.184 (2.46)	.941
Customer interaction quality	Slow vs. Medium	3.94 (3.04)	.197
	Slow vs. Fast	3.99 (2.95)	.180
	Medium vs. Fast	.05 (3.01)	.988
Customer emotions positive	Slow vs. Medium	7.26 (3.64)	.048*
	Slow vs. Fast	7.02 (3.55)	.050
	Medium vs. Fast	-.24 (3.64)	.948
Customer emotions negative	Slow vs. Medium	-5.88 (4.69)	.213
	Slow vs. Fast	-1.53 (4.55)	.738
	Medium vs. Fast	4.35 (4.64)	.351

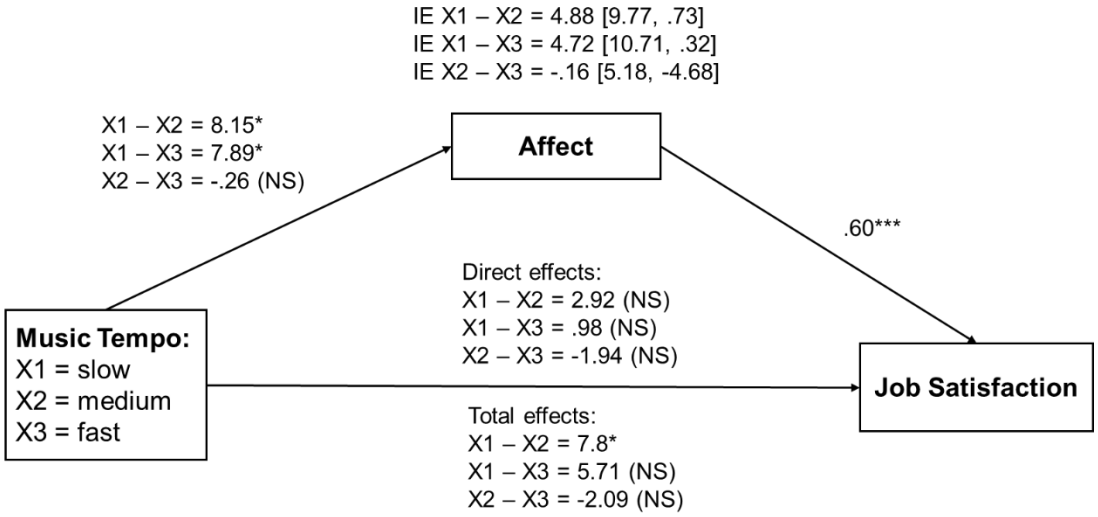
Note: All constructs were measured on a scale of 0-101. ***p < .001, **p < .01, *p < .05

4.5.3 Why Music Tempo increases Job Satisfaction

To test whether differences in affect across the three conditions mediate employees' job satisfaction (Research Question 3), we conducted a mediation analysis with the tempo conditions as a multi-categorical variable, by means of model 4 of Hayes' PROCESS macro to calculate the contrasts between

conditions (Hayes, 2017). After testing the model with 5,000 bootstrap iterations, we find that affect mediated the effect of music tempo on job satisfaction (Figure 4.1). That is, higher job satisfaction when slow (vs fast) and slow (vs medium) music is played is explained by increases in employees' affect in the slow music condition. However, no significant mediation was found explaining job satisfaction comparing the fast and medium tempo conditions.

Figure 4.1 Mediation



***$p < .001$, **$p < .01$, *$p < .05$

4.5.4 Employees' Perceptions of In-store Music

Whereas the previously reported findings reflect employees' general feelings at work, the final measures in our survey more directly assessed their awareness and perceptions of the music played. The results indicate that employees' awareness of the music did not differ across tempo conditions, $F(1, 126) = 0.51$, $p = .60$. Similarly, no significant differences emerged between conditions in perceived store fit, $F(1, 126) = 0.71$, $p = .49$, or in perceived energy level of the music, $F(1, 126) = 2.07$, $p = .13$.

Perceptions of how pleasant the music was, $F(1, 126) = 0.81$, $p = .45$, and the extent to which employees believed the music affected their mood, $F(1, 126) = 0.78$, $p = .46$, also did not differ by tempo condition. Taken together with earlier findings showing that employees exposed to slow music reported more positive affect, these results suggest that employees may be unaware of the beneficial effect slow music has on their mood and job satisfaction.

4.6 General Discussion and Conclusion

Bitner's (1992) concept of the servicescape indicates that background music is an important element in creating a congruent and pleasant store atmosphere, and that this atmosphere can affect customers, employees, and the interaction between the two. The goal of the current research was to investigate how background music *tempo* influences retail dynamics, focusing not only on customers but also on employees, a group often overlooked in the literature on servicescapes. By combining a large-scale field experiment with a more fine-grained methodological set-up and employee data, this study offers new insights into how subtle environmental cues like music tempo can affect both sides of the service encounter. Specifically, the study addressed three core questions: (1) How does music tempo influence store turnover? (2) Do these effects vary depending on customer engagement with the store? (3) How does music tempo shape employees' affective states, and in turn, their job satisfaction and customer orientation?

In response to the first research question, our findings showed that music tempo did not significantly influence store turnover, challenging earlier studies that reported higher sales with slower music (Milliman, 1982; Knöferle et al., 2012). Regarding the second research question, we found no evidence that the effect of music tempo differed based on whether customers were members of the store's loyalty program. Importantly, in comparison to previous studies, the current study not only offers a higher-powered study (i.e., using a larger sample) and cleaner experimental set-up (i.e., using three tempo conditions, reducing the risk of blurred contrasts that may have affected earlier results), but also offered the option to explore whether previously documented differences may emerge due to differences in customer type (i.e., loyal vs occasional shoppers).

The third research question focused on how tempo influences employee affect, satisfaction, and customer-related behavior. Results indicated that slow music tempo has beneficial effects for employees, enhancing their mood at work and their job satisfaction. Moreover, music tempo showed a serial impact: slower music improved employees' affective states, which in turn enhanced their job satisfaction. Moreover, our results highlight that employees are not aware of the effect music tempo can have on their mood and job satisfaction: While we find heightened job satisfaction among employees in the slow tempo condition, when asked how the music played impacted their mood employees indicated that it had no effects.

Overall, these findings suggest that servicescapes are experienced differently by employees than by customers. While customers' exposure to music is brief and situational, employees are continuously

immersed in the store environment, which seems to make the emotional effects of music highly consequential for employees.

Taking a practical perspective, although our results challenge earlier claims that slower music boosts immediate sales, they highlight a different but equally important outcome: background music tempo significantly shapes the emotional experience of employees. Retailers should not overlook this finding. Employees play spend extended periods in the store environment and are continuously exposed to its sensory cues. Our study shows that slower background music can enhance employees' affective states and, in turn, their job satisfaction, without them even being aware of this effect. Given the critical role employee satisfaction plays in shaping the overall service experience (Wolter et al., 2019), potentially fostering customer return behavior (e.g., through more engaged, patient, and attentive staff), supporting staff well-being is not just important in an off itself but also a strategic lever for long-term customer loyalty.

Moreover, music tempo is a low-cost, non-invasive, and easily adjustable tool. Unlike structural renovations or costly training programs, altering the store's soundtrack offers a simple yet effective way to influence the work atmosphere. Retailers aiming to cultivate a more positive in-store climate for their staff may benefit from deliberately incorporating slower music into their playlists. Even if such adjustments do not translate into immediate turnover gains, they can contribute to a more sustainable and service-oriented retail environment.

Based on the current insights, we identify some directions for future studies: First, although music tempo did not significantly influence overall sales in our study, it may still shape how consumers engage with the purchasing process. Future studies could examine whether background music affects purchase patterns, such as frequency or basket size; customers may, for instance, make more frequent but smaller purchases depending on music tempo. Additionally, investigating return rates may provide further nuance: slower music could foster more deliberate decision-making, potentially reducing impulsive purchases and thereby lowering the likelihood of product returns.

Second, our study used a broad mix of musical genres across tempo conditions. It is possible that the positive effects of slow music on employee affect and satisfaction are further amplified when the tempo aligns with a genre that fits the store's atmosphere or employee preferences. Future research could therefore explore genre-tempo interactions, testing whether certain combinations (e.g., slow-tempo acoustic or instrumental music) are more effective in promoting employee well-being than others. This line of inquiry could help retailers fine-tune their music strategies to better support staff engagement and satisfaction.

4.7 References

Ahlbom, C. P., Roggeveen, A. L., Grewal, D., & Nordfält, J. (2023). Understanding how music influences shopping on weekdays and weekends. Journal of Marketing Research, 60(5), 987-1007.

Anwar, A., Waqas, A., Zain, H. M., & Kee, D. M. H. (2020). Impact of music and colour on customers' emotional states: An experimental study of online store. Asian Journal of Business Research, 10(1), 104-125.

Biswas, D., Lund, K., & Szocs, C. (2019). Sounds like a healthy retail atmospheric strategy: Effects of ambient music and background noise on food sales. Journal of the Academy of Marketing Science, 47, 37-55.

Bitner, M. J. (1992). Servicescapes: The impact of physical surroundings on customers and employees. Journal of Marketing, 56(2), 57-71.

Caldwell, C., & Hibbert, S. A. (2002). The influence of music tempo and musical preference on restaurant patron's behavior. Psychology & Marketing, 19(11), 895–917.

Chen, G., & Li, S. (2021). Effect of employee–customer interaction quality on customers' prohibitive voice behaviors: Mediating roles of customer trust and identification. Frontiers in Psychology, 12, 773354.

Christen, M., Iyer, G., & Soberman, D. (2006). Job satisfaction, job performance, and effort: A reexamination using agency theory. Journal of Marketing, 70(1), 137-1.

Daunfeldt, S. O., Moradi, J., Rudholm, N., & Öberg, C. (2021). Effects of employees' opportunities to influence in-store music on sales: Evidence from a field experiment. Journal of Retailing and Consumer Services, 59, 102417.

Esfidani, M. R., Rafiei Samani, S., & Khanlari, A. (2022). Music and consumer behavior in chain stores: theoretical explanation and empirical evidence. The International Review of Retail, Distribution and Consumer Research, 32(3), 331-348.

Falter, M., & Hadwich, K. (2020). Customer service well-being: scale development and validation. The Service Industries Journal, 40(1-2), 181-202.

Garlin, F. V., & Owen, K. (2006). Setting the tone with the tune: A meta-analytic review of the effects of background music in retail settings. Journal of Business Research, 59(6), 755-764.

Grewal, R., Mehta, R., & Kardes, F. R. (2004). The timing of repeat purchases of consumer durable goods: The role of functional bases of consumer attitudes. Journal of Marketing Research, 41(1), 101-115.

Gupta, N., & Verma, H. V. (2021). Other customers in shared servicescape: A systematic review and future research agenda. Journal of Services Research, 21(2), 189-239.

Hayes, A. F. (2017). Introduction to mediation, moderation, and conditional process analysis: A regression-based approach. Guilford Press.

Herrington, J. D. (1996). Effects of music in service environments: a field study. Journal of Services Marketing, 10(2), 26-41.

Knoferle, K. M., Spangenberg, E. R., Herrmann, A., & Landwehr, J. R. (2012). It is all in the mix: The interactive effect of music tempo and mode on in-store sales. Marketing Letters, 23, 325-337.

Löhndorf, B., & Diamantopoulos, A. (2014). Internal branding: Social identity and social exchange perspectives on turning employees into brand champions. Journal of Service Research, 17(3), 310-325.

Mari, M., & Poggesi, S. (2013). Servicescape cues and customer behavior: a systematic literature review and research agenda. The Service Industries Journal, 33(2), 171-199.

Meyer-Waarden, L. (2008). The influence of loyalty programme membership on customer purchase behaviour. European Journal of Marketing, 42(1/2), 87-114.

Michel, A., Baumann, C., & Gayer, L. (2017). Thank you for the music–or not? The effects of in-store music in service settings. Journal of Retailing and Consumer Services, 36, 21-32.

Milliman, R. E. (1982). Using background music to affect the behavior of supermarket shoppers. Journal of Marketing, 46(3), 86–91.

North, A. C., & Hargreaves, D. J. (1998). The effect of music on atmosphere and purchase intentions in a cafeteria 1. Journal of Applied Social Psychology, 28(24), 2254-2273.

North, A. C., Hargreaves, D. J., & McKendrick, J. (1999). The influence of in-store music on wine selections. Journal of Applied Psychology, 84(2), 271.

Paillé, P. (2011). Stressful work, citizenship behaviour and intention to leave the organization in a high turnover environment: examining the mediating role of job satisfaction. Journal of Management Research, 3(1), 1-14.

Ray, T. K. (2021). Work related well-being is associated with individual subjective well-being. Industrial Health, 60(3), 242-252.

Rogers, J. D., Clow, K. E., & Kash, T. J. (1994). Increasing job satisfaction of service personnel. Journal of Services Marketing, 8(1), 14-26.

Skandrani, H., Ben Dahmane Mouelhi, N., & Malek, F. (2011). Effect of store atmospherics on employees' reactions. International Journal of Retail & Distribution Management, 39(1), 51-67.

Soh, K. L., Jayaraman, K., Choo, L. P., & Kiumarsi, S. (2015). The impact of background music on the duration of consumer stay at stores: an empirical study in Malaysia. International Journal of Business and Society, 16(2).

Sullivan, M. (2002). The impact of pitch, volume and tempo on the atmospheric effects of music. International Journal of Retail and Distribution Management, 30(6), 323–330.

Vida, I. (2008). The impact of atmospherics on consumer behaviour: the case of the music fit in retail stores. Economic and Business Review, 10(1), 21.

Wolter, J. S., Bock, D., Mackey, J., Xu, P., & Smith, J. S. (2019). Employee satisfaction trajectories and their effect on customer satisfaction and repatronage intentions. Journal of the Academy of Marketing Science, 47, 815-836.

5 Spanish Living Lab 3

María de Miguel Molina, Blanca de Miguel Molina, Daniel Catalá Pérez, Conrado Carrascosa López, Management Department, Universitat Politècnica de València

Valencia, Spain

5.1 Abstract

The objective of this living lab has been to continue the first analysis of the **social** and **cultural** values of **background** music in a supermarket, considering if our previous results with customers coincide with employees' preferences. We have applied a **qualitative** content analysis from the results of a semi-structured interview with 55 employees. The results show some coincidences and some discrepancies that could be solved by providing cultural and social values (shared values) through background music, based on the language of the songs and the decades they belong to. Also, it is important to pay attention to repetitive lists of songs not to annoy employees as well as the lyrics to promote **ethical value**.

5.2 Context

There is a debate as to whether background music should be based solely on customer preferences as opposed to those of the store's employees (Vida et al., 2007). Some authors suggest that sales can even decrease when employees select background music that is not linked to customer preferences (Daunfeldt et al., 2021). Moreover, Wu (2024) finds that the use of background music at work requires caution in terms of song lyrics and melodies as these could distract employees and reduce working efficiency. However, Plourde (2017) studies the use of background music in managing employee stress, and Axelsen et al. (2022) find that music decreases employees' self-perceived stress. In addition, Skandrani, Dahmane Mouelhi and Malek (2011) suggest that a lack of variation in music playlists, a mismatch between music type and employees' preferences, and long exposure to the same tempo, could affect employees' attitudinal and behavioural responses. Therefore, it is necessary to select background music balancing both customers and employees' preferences.

5.3 Methodology

Based on a literature review, we have prepared the questions for semi-structured interviews with employees of the same Spanish supermarket of part 1, which is in a department store. This has involved including different variables in the questions when selecting background music, such as the amount of time spent shopping, the genre, the tempo, the volume, the language, and the impact on employees' emotions.

The open questions are similar in the employee interviews, though are more focused on selling. They have been pre-tested with an employee and the company. The company has delivered an asynchronous online form to 55 employees with departmental responsibility, so that they could respond as and when they are available. The employees are 50 years old on average. The questionnaire is sent in the first week of June 2025. Again, the responses are anonymous, and we provide respondents with personal data guarantees. Only global results are shared with the company to improve background music.

The research group agrees to select the codes based on the customer ones so we can compare the two groups (Table 5.1). We also add two more codes: repetitive song lists (as included in some literature about employees) and ethical value (which is mentioned by one of the employees). We analyse the content using the ATLASti software (2025).

When we started our study with customers, the lyrics of the songs used by this department store were almost 100% in English. Later, the employee study included more songs in Spanish (13.7%).

Table 5.1. Codes compared for content analysis. Own source.

Customer Codes	Employee Codes
Musical genre	Musical genre
Background music influence: accompaniment	Background music influence: accompaniment
	Repetitive list of songs
Shopping experience: music preference	Selling experience: music preference
Cultural value: memories	Cultural value: memories
Social interactions	Social interactions
Shopping experience: music influence	Selling experience: music influence
Emotions related to music	Emotions related to music
Shopping experience: music volume and tempo	Selling experience: music volume and tempo
Shopping experience: sound quality	Selling experience: sound quality
Disturbing noises	Disturbing noises
Influence of music on mood	Influence of music on mood
Amount of time spent shopping	Amount of time customers spend shopping
Influence of music on buying products	Influence of music on customer purchases
Background music recommendations	Background music recommendations
	Ethical value

5.4 Analysis and Results

The following results are obtained in terms of social and cultural values:

5.4.1 Social value

The employees prefer background music from the 80s or from today. Their favourite type of music is pop, followed by rock, which coincide with the customers' preferences. They do not like aggressive music, such as hard rock, heavy metal and reggaeton. The quality of sound depends on the store

location. The sound is loud in some departments and low in others. The employees are more tolerant of the advertisements as they believe they are necessary.

Background music is highly valued because it improves mood and productivity. Neither employees nor customers understand working or shopping without music. The employees also state that background music is important for customers. What employees do not like is repetitive song lists as this dampens their mood.

5.4.2 Cultural value

Employees also relate music to memories. They also prefer the lyrics to be in Spanish, though they like mixed Spanish-English song lists. This is in line with customer preferences. However, they do not like songs that are sad and slow because they dampen their mood. These songs are only welcome at specific times. This goes against customer preferences and therefore requires striking a balance between the two groups.

The study reveals a discrepancy between the two groups in that customers do not believe that background music influences them to buy more. However, employees perceive that more purchases are made, for example when Christmas songs are played.

Finally, one employee relates to the ethical content of some lyrics because some of them are not appropriate for all customer age groups. Thus, we can also infer the ethical value of music.

5.5 Conclusions Spanish Living Lab 3

This study has explored the balance between customers and employees' preferences of background music in this supermarket department store. The results show that although most customers do not pay much attention to background music when shopping, employees are more aware of it, though the choice of songs is not always related to their musical preferences. The store featured in this case study uses relaxing music, which makes customers feel comfortable but is boring for some employees as most of the songs end up being repeated.

Although the department store chain is Spanish, not much music in Spanish is played. We argue that a commitment to more carefully curated music, together with consultation with both customers and employees about its impact, could constitute a differentiating value for this type of store. In practice, music is generally selected with customers in mind; however, its impact on employees' moods is considerably greater.

Cultural and social values may not encourage all shoppers to spend more money or all employees to be kinder, but they are shared values that can improve the customer and employee experiences and strengthen their connection with the brand.

5.6 References

ATLASti (2025). ATLAS.ti Scientific Software Development GmbH. ATLAS.ti Mac (version 25.0.1) [Qualitative data analysis software]. https://atlasti.com

Axelsen, J.L., Meline, J.S.J., Staiano, W., Kirk, U. (2022). “Mindfulness and music interventions in the workplace: assessment of sustained attention and working memory using a crowdsourcing approach”. BMC Psychology, 10 (1), art. no. 108, DOI: 10.1186/s40359-022-00810-y

Daunfeldt, S.O., Moradi, J., Rudholm, N. and Öberg, C. (2021). “Effects of employees’ opportunities to influence in-store music on sales: Evidence from a field experiment”. Journal of Retailing and Consumer Services, 59, 102417. DOI: 10.1016/j.jretconser.2020.102417

Plourde, L. (2017). “Sonic air-conditioning: Muzak as affect management for office workers in Japan”. Senses and Society, 12(1), 18-34. DOI: 10.1080/17458927.2017.1268812

Skandrani, H., Dahmane Mouelhi, N.B. and Malek, F. (2011). “Effect of store atmospherics on employees’ reactions“. International Journal of Retail Distribution Management, 39(1), 51–67. DOI: 10.1108/09590551111104477

Vida, I., Obadia, C. and Kunz, M. (2007). “The Effects of Background Music on Consumer Responses in a High-end Supermarket”. The International Review of Retail, Distribution and Consumer Research, 17(5), 469-482. DOI: 10.1080/09593960701631532

Wu, R. (2024). “Exploring the Emotional, Cognitive, and Background Music Use: Their Influences on Employee”. Creativity Proceedings 2024 International Conference on Language Technology and Digital Humanities, LTDH 2024, 128-132. DOI: 10.1109/LTDH64262.2024.00034

6 Spanish Living Lab 4

Blanca de Miguel Molina, Daniel Catalá Pérez, María de Miguel Molina, Conrado Carrascosa López, Management Department, Universitat Politècnica de València, Valencia, Spain

6.1 Abstract

This living lab involves an event celebrated in Torrent (Valencia) every year in March during Fallas, The Floral Offering. As music accompanies the parade, this living lab aims to analyse the **non-monetary values** of music for participants, and its relationship to making the event memorable and authentic. Values analysed include the **cultural and ethical values** of music, as well as the event's cultural value. Results indicate a positive relationship between music values and the event's authenticity, memorability, and loyalty.

6.2 Context

The Flowers Offering is an important parade celebrated during Fallas in Valencia and other parts of the Valencian region, and it is accompanied by music. The living lab introduces the analysis of the ethical value* of music in cultural events, which has been less explored than the cultural value in previous studies. Cultural values tend to focus on the artistic quality of music in events (Behr et al., 2016; Van der Hoeven and Hitters, 2019). The ethical value of music has been analysed in the works of Weijters et al. (2014), Green et al. (2016), Preniqi et al. (2023), and Higgins (2023). Weijters et al. (2014) focus on pay for artists' music, while Green et al. (2016) claim to support music and local musicians, as well as the influence of artists' positive behaviour. Preniqi et al. (2023) and Higgins (2023) focus on lyrics in songs, their values, and morals.

*See Deliverable 1.2 of the Music360 EU Project for additional information about types of values (de-Miguel-Molina et al., 2024).

6.3 Methodology

Data for the analysis were collected through an online survey on the Qualtrics XM platform from 15th June to 14th July 2024, when the survey link was closed. The collected answers were 82, while the completed answers for subsequent analysis were 60. The participants include 44 women (73.33%) and 16 men (26.67%).

Variables in the analysis were obtained from a literature review and are shown in Table 6.1. The *cultural* value of the event is adapted from Rivetti & Lucadamo (2023), the cultural value of *music* is adapted from Nguyen et al. (2020), and the *ethical* value of music is adapted from Green et al. (2016). *Authenticity* of the event is adapted from Liu et al. (2022), and the *memorable* event is adapted from

He et al. (2023). The *loyalty* variable is adapted from Rivetti & Lucadamo (2023). The variables range from 0 to 10. Additionally, a variable measuring *motivation* to attend the event is added, with four values: cultural, religious, social, and other.

Table 6.1. Variables in the analysis. Own source.

Variables	Description
CULTURAL	
cultural1	I participate in the Floral Offering to increase my cultural background
cultural2	I participate in the Floral Offering to learn and understand the culture and traditions of the Fallas
cultural3	I participate in the Floral Offering to learn and understand the culture and traditions of this city
MUSIC	
music1	The quality of the music is very high
music2	The list of works/pieces performed is extraordinary
music3	The list of works/pieces performed is creative
music4	The order of the plays/pieces performed is well planned
ETHICAL	
ethics1	In the selection of music, it is important that the music represents a good example for children and young people
ethics2	In the selection of music, it is important that the music of local and regional artists is supported
ethics3	In the selection of music, it is important to ensure payment of royalties to artists for the use of their music
AUTHENTICITY	
authentic1	The cultural heritage of the Fallas is well preserved
authentic2	Historical and cultural tradition is maintained
authentic3	The atmosphere of traditional culture is real and firm

Variables	Description
MEMORABLE	
memorable1	Deliver experiences that other events can't imitate
memorable2	The atmosphere is hard to find at other events
memorable3	It is held in an environment that other events cannot offer
memorable4	The activities it includes are difficult to repeat for other events
LOYALTY	
loyalty1	I will make positive comments
loyalty2	I will recommend it to other people
loyalty3	I'll be back in the future

Analysis is conducted with RStudio software (version 2025.09.1). Spearman correlation and Kendall's Tau b are obtained and visualized with the libraries ggstatsplot (Patil, 2021) and ggplot2 (Wickham, 2016). Both tests are nonparametric and can be used when data are not normally distributed and ordinal (Humble, 2020).

Comparison by groups for motivation to attend, in relation to cultural and ethical values of music, is performed using the standard R libraries with the function Kruskal.test. The Kruskal.test calculates the Kruskal-Wallis, which is an extension of the Mann-Whitney U for testing differences between three or more groups on an ordinal variable (McKnight and Najab, 2010).

6.4 Results

6.4.1 Correlations

Correlations among variables are presented in Figures 6.1 and 6.2. The plot in Figure 6.1 is based on Spearman's correlations, while the plot in Figure 6.2 is based on Kendall's Tau b.

The significant correlations differ depending on whether the Kendall or the Spearman test is used. A summary of the correlations obtained is presented in Table 6.2. According to this table and Figures 6.1 and 6.2, there are no significant correlations between the items in cultural value of the event and the items in authenticity, memorable, and loyalty. However, Figures 1 and 2 show correlations between cultural value and music, and between cultural and ethical values.

Regarding the music, results indicate significant correlations among items measuring the cultural value of music and those measuring authenticity, memorable event, and loyalty. And, for the ethical value of music, we also find significant correlation with authenticity, memorable event and loyalty. Moreover, results show that there are significant correlations among authenticity, memorable event and loyalty.

Table 6.2. Summary of correlations. Own source.

Variables	Variables correlated according to Spearman	Variables correlated according to Kendall
Cultural	*Authenticity*: no significant correlation *Memorable*: no significant correlation *Loyalty*: no significant correlation	*Authenticity*: no significant correlation *Memorable*: no significant correlation *Loyalty*: no significant correlation
Music	***Authenticity***: significant correlation ***Memorable***: significant correlation *Loyalty*: no significant correlation	***Authenticity***: significant correlation ***Memorable***: significant correlation **Loyalty**: significant correlation
Ethical	***Authenticity***: significant correlation between ethics2 and authentic1 ***Memorable***: significant correlation between ethics1 and memorable1 *Loyalty*: no significant correlation	*Authenticity*: no significant correlation ***Memorable***: significant correlation between ethics3 and memorable1 **Loyalty**: significant correlation between ethics2 and loyalty1
Authenticity	***Loyalty***: significant correlation	***Loyalty***: significant correlation
Memorable	***Loyalty***: significant correlation with memorable2 and memorable3	***Loyalty***: significant correlation

Figure 6.1. Spearman correlations for variables in event 3. Own source.

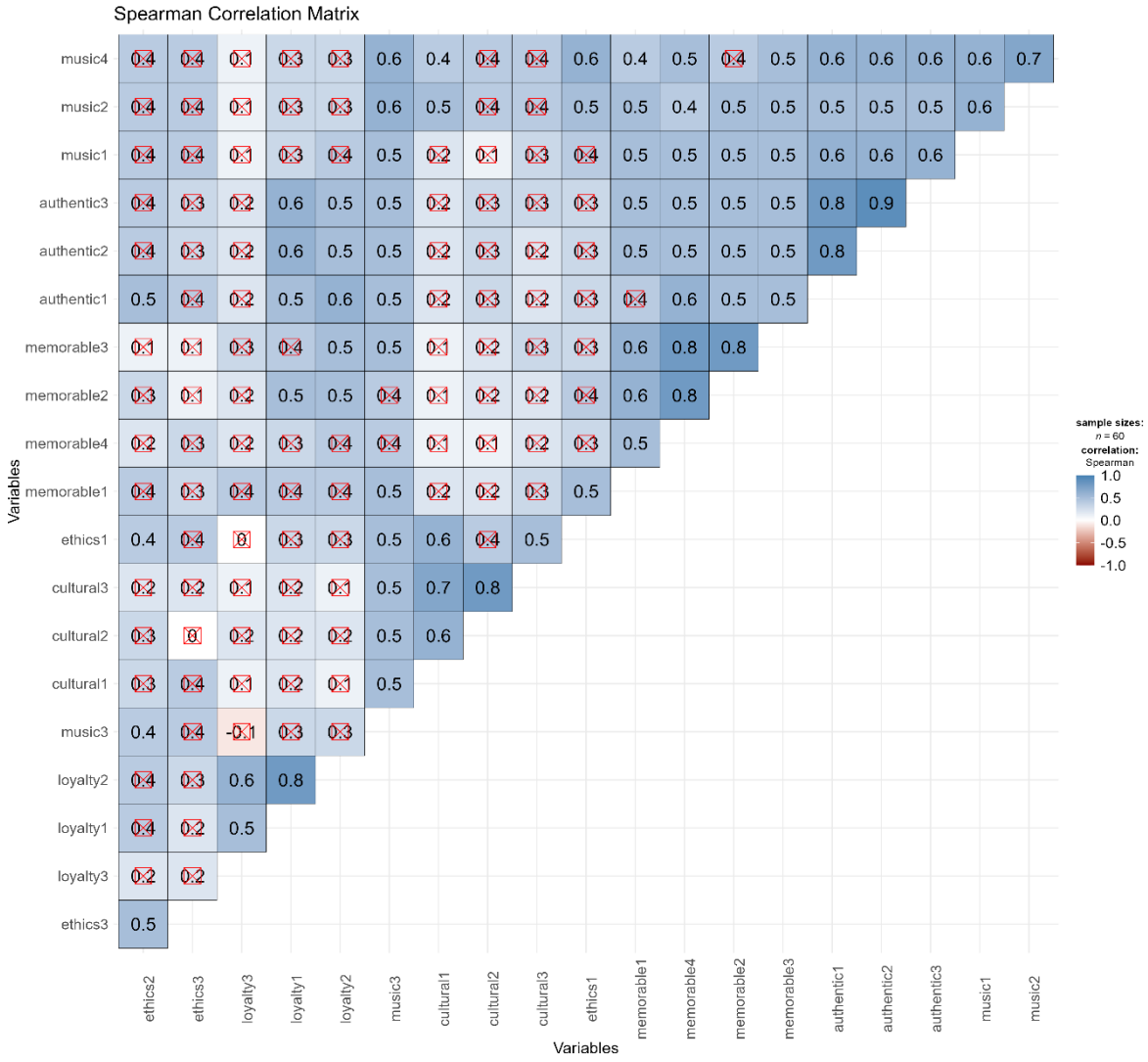
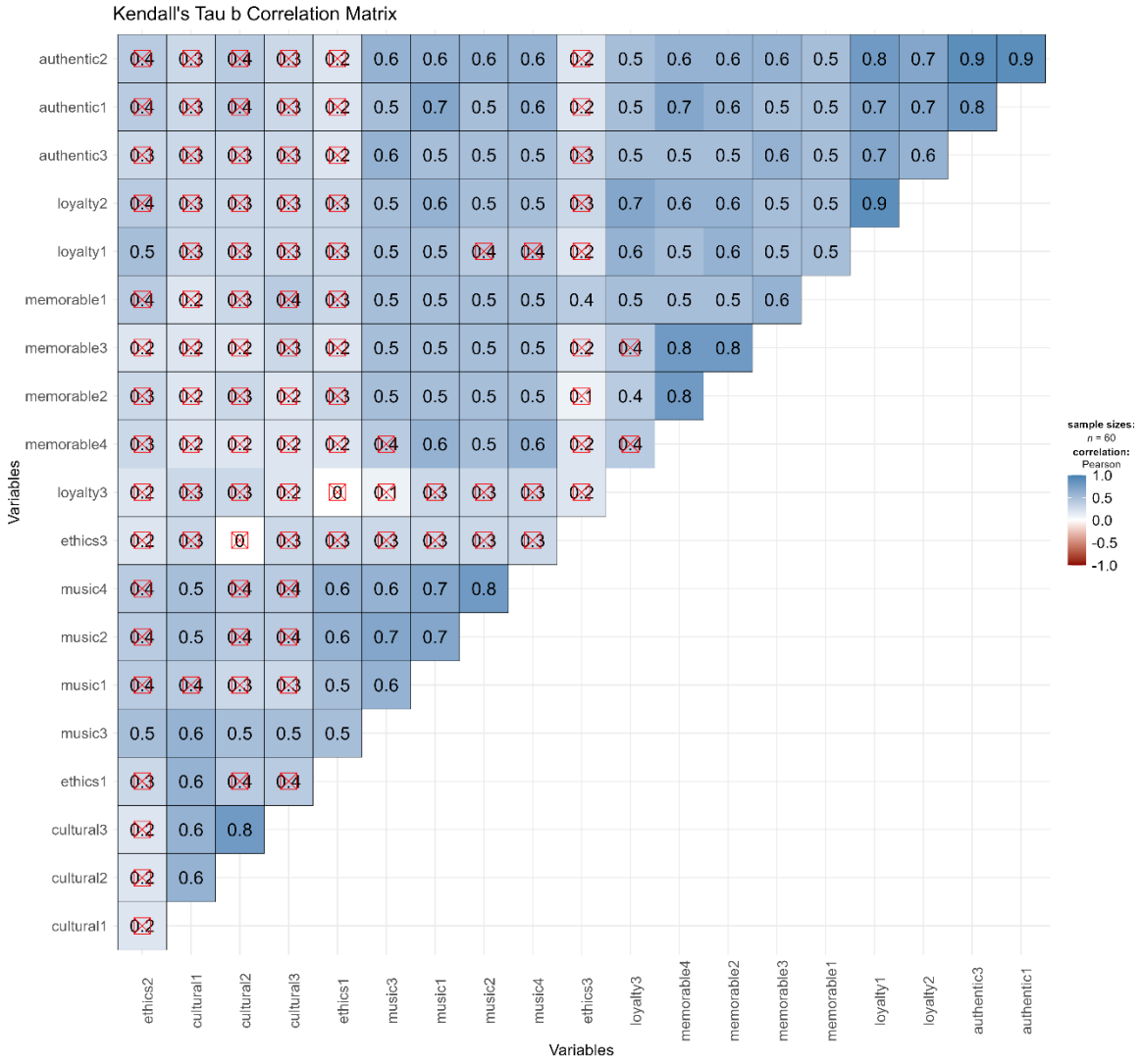


Figure 6.2. Kendall's Tau b correlations for variables in event 3. Own source.



6.4.2 Comparing groups

The Kruskal-Wallis test is used to measure the differences between items in the variable music and the groups in motivation to attend the event (the four motivations), and between items in the variable ethics and the groups in motivation to attend. Results indicate that there are no significant differences between the groups independently of the item analysed:

- Kruskal-Wallis test between music1 and motivation to attend indicates that there are no significant differences between the groups (Chi2 = 1.88, df = 2, p-value = .39).
- Kruskal-Wallis test between music2 and motivation to attend indicates that there are no significant differences between the groups (Chi2 = 1.58, df = 2, p-value = .45).
- Kruskal-Wallis test between music3 and motivation to attend indicates that there are no significant differences between the groups (Chi2 = 5.68, df = 2, p-value = .058).

- Kruskal-Wallis test between music4 and motivation to attend indicates that there are no significant differences between the groups (Chi2 = 1.697, df = 2, p-value = .43).
- Kruskal-Wallis test between ethics1 and motivation to attend indicates that there are no significant differences between the groups (Chi2 = 3.206, df = 2, p-value = .20).
- Kruskal-Wallis test between ethics2 and motivation to attend indicates that there are no significant differences between the groups (Chi2 = 1.137, df = 2, p-value = .57).
- Kruskal-Wallis test between ethics3 and motivation to attend indicates that there are no significant differences between the groups (Chi2 = 5,75, df = 2, p-value = .056).

6.5 Conclusions Spanish Living Lab 4.

This document has presented the fourth living lab conducted in Spain and analyses an event held in 2024 in Torrent, a city near Valencia. The event, the Flowers Offering, is a parade celebrated every year during Fallas. The stakeholders surveyed were participants in the event, and the analysis included 60 participants who completed the survey.

The three main conclusions obtained after the analyses are the following:

- The cultural value of music correlates positively with the cultural value of the event and the ethical value of the music.
- Music values (cultural and ethical) correlate positively with the authenticity of the event, being a memorable event, and loyalty to the event.
- Variables authenticity of the event and memorable event correlate positively with loyalty to the event.

Limitations in the analysis are related to the number of participants who answered the surveys. Also, the study focuses on a single location, even though these types of events are celebrated in several locations across Valencia. Lastly, the descriptive analysis in this document needs to be extended to test models that might yield additional results.

Future research might focus on more advanced data analyses to validate the relationship between music values (cultural and ethical) and the intention to repeat, with a focus on enabling the authenticity and memorability of the event.

6.6 References

Behr, A., Brennan, M., Cloonan, M., Frith, S., & Webster, E. (2016). Live concert performance: An ecological approach. *Rock Music Studies*, 3(1), 5-23.

De-Miguel-Molina, B., De-Miguel-Molina, M., Catalá-Pérez, D., Carrascosa-López, C., Krywuczky, F., Giachetti, G., Pastor, O., Leijen, I.J.C., & Verlegh, P. (2024). D1.2 A framework to quantify and qualify the value of music – version 2. Music360. A 360 Degrees Perspective on The Value of Music. Horizon Europe project (https://music-360.eu/deliverables/)

Green, T., Sinclair, G., & Tinson, J. (2016). Do they know it's CSR at all? An exploration of socially responsible music consumption. *Journal of Business Ethics*, 138(2), 231-246.

He, Y., Ma, J., & Zhang, P. (2023). Perceived authenticity of hallmark event brands: Conceptualization, measurement, and an integrative framework. *Journal of Destination Marketing & Management*, 27, 100766.

Higgins, K. (2023). Ethics and music. The Oxford Handbook of Ethics and Art. Oxford University Press, New York.

Humble, S. (2020) Quantitative Analysis of Questionnaires. Techniques to Explore Structures and Relationships. Routledge, Oxon (UK) and NY.

Liu, H., Park, K. S., & Wei, Y. (2024). An extended stimulus-organism-response model of Hanfu experience in cultural heritage tourism. *Journal of Vacation Marketing*, 30(2), 288-310.

McKnight, P.E. & Najab, J. (2010). Kruskal-Wallis Test. The Corsini Encyclopedia of Psychology. John Wiley & Sons (https://onlinelibrary.wiley.com/doi/full/10.1002/9780470479216.corpsy0491)

Nguyen, T., Lee, K., Chung, N., & Koo, C. (2020). The way of generation Y enjoying Jazz festival: A case of the Korea (Jarasum) music festival. *Asia Pacific Journal of Tourism Research*, 25(1), 52-63.

Patil, I. (2021) Visualizations with statistical details: The 'ggstatsplot' approach. *Journal of Open Source Software*, 6(61), 3167.

Preniqi, V., Kalimeri, K., & Saitis, C. (2023). Soundscapes of morality: Linking music preferences and moral values through lyrics and audio. *Plos one*, 18(11), e0294402.

Rivetti, F. & Lucadamo, A. (2023). Cultural festival attendees: a path from motivation to loyalty. *Current Issues in Tourism*, 26, 3499-3515

Van der Hoeven, A., & Hitters, E. (2019). The social and cultural values of live music: Sustaining urban live music ecologies. *Cities*, 90, 263–271.

Weijters, B., Goedertier, F., & Verstreken, S. (2014). Online music consumption in today's technological context: Putting the influence of ethics in perspective. *Journal of Business Ethics*, 124(4), 537-550.

Wickham, H. (2016). ggplot2: Elegant Graphics for Data Analysis. Springer-Verlag New York. ISBN 978-3-319-24277-4. https://ggplot2.tidyverse.org

7 Spanish Living Lab 5

Conrado Carrascosa López, María de Miguel Molina, Blanca de Miguel Molina, Daniel Catalá Pérez, Management Department, Universitat Politècnica de València, Valencia, Spain

7.1 Abstract

In this living lab, we explored and defined the values that music can offer to patients attending the oncology day hospital. To this end, two types of interventions were implemented: guided relaxation sessions using recorded music and live mini-concerts. The main objective was to assess the benefits provided by each approach in order to determine their suitability. The evaluation was conducted using a clinical symptom-assessment scale administered to cancer patients. The results show that the two interventions offer different types of benefits, and that both provide highly valuable support to patients during moments of difficulty.

7.2 Context

Music therapy is implemented across a wide range of demographic groups and clinical contexts, from neonatal intensive care units (Vianna et al., 2011) to end-of-life care in palliative settings (Gallagher et al., 2018). Many authors highlight that these interventions are characterised by an absence of adverse effects while consistently demonstrating their value in alleviating distressing symptoms associated with recovery processes in various illnesses, particularly conditions requiring prolonged hospitalisation, such as cancer (Krishnaswamy & Nair, 2016). Long-term therapeutic treatments of this kind often lead to stress, anxiety, depression, and other unwanted consequences. Within hospital environments, music therapy has therefore emerged as a highly effective strategy for mitigating these symptoms (Ramírez et al., 2018).

Music therapy is frequently integrated into cancer care. For instance, studies by Krishnaswamy and Nair (2016) and Peng et al. (2019) examine its application among hospitalised cancer patients. However, despite its widespread use, there is still a lack of clarity regarding the specific effects produced by different music therapy approaches. In this living lab, we sought to compare two distinct modalities, applied within the same clinical context and to the same patient group, in order to shed light on their differential contributions.

7.3 Methodology

The methodology was designed based on the literature review. Before starting the music therapy sessions, several explanatory meetings were held with the patients, and informed consent was

obtained from those who voluntarily agreed to participate in the study. At this initial stage, an anonymous personal record was completed, containing the information required for subsequent data analysis.

To assess the effects of the different therapeutic tools, we used the Edmonton Symptom Assessment System (ESAS) for cancer patients, adapted into Spanish. This questionnaire evaluates cancer-related symptoms as reported by the patients and is completed both before the sessions begin and immediately after each one ends.

The living lab began by testing the guided relaxation tool using recorded music. Several sessions were conducted over a three-week period. At the end of each relaxation session, patients completed the questionnaire again. Subsequently, over another three-week period, live mini-concerts were held in the same room. Likewise, after each mini-concert, participating patients filled in the questionnaire once more.

7.4 Analysis and Results

The following table 7.1 presents the data from the sample of patients who ultimately participated in the living lab.

Table 7.1. Results. Data sample. Own source

	Patients	Average Age
Men	16	63
Women	23	58
Type of Cancer	Patients	Percentage
Breast	11	28,21%
Lung	9	23,08%
Colon	4	10,26%
Lymphoma	4	10,26%
Mixed	4	10,26%
Prostate	2	5,13%
Ovary	2	5,13%
Endometrium	1	2,56%
Testicle	1	2,56%

Bladder	1	2,56%

After compiling all the information obtained from the patients' pre- and post-intervention questionnaires, the data analysis was carried out. The value considered for each variable was the improvement observed between the final and initial scores on the Edmonton Symptom Assessment System. The symptoms assessed included Pain, Tiredness, Drowsiness, Nausea, Appetite loss, Shortness of breath, Depression, Anxiety, Difficulty sleeping, and Overall wellbeing.

7.4.1 Relaxation music intervention

The results of the relaxation-music intervention are presented in Table 7.2.

Table 7.2. Results. Music guided relaxing sessions

	Patients	
	Men	Women
Improvements on scale	7	14
Pain	1,57	0,35
Tiredness	3,14	2,64
Drowsiness	2,28	0,5
Nausea	0,57	0,57
Appetite los	1,57	1,85
Shortness of breath	0	0,64
Depresion	1,42	1,64
Anxiety	2,28	2
Difficulty sleeping	1,42	1,14
Wellbeing	3,14	2,71

As shown in the table, the results differ considerably between men and women, although both groups exhibit improvements across all items of the scale. Notably, the three greatest improvements are the same for both men and women: tiredness, wellbeing, and anxiety.

Mini concerts live

The results of the mini concerts live intervention are presented in Table 7.3.

Table 7.3. Results. Mini concerts live.

	Patients	
	Men	Women
Improvements on scale	11	13
Pain	0,9	0,38
Tiredness	1,9	2
Drowsiness	2,63	0,92
Nausea	0,45	0,76
Appetite los	1,09	2,3
Shortness of breath	0,81	0,23
Depresion	0,54	1,53
Anxiety	0,45	2,76
Difficulty sleeping	0,63	1,69
Wellbeing	0,9	1,84

On the other hand, the results of the live mini-concerts show greater variation between men and women. While women exhibit the largest improvements in anxiety, appetite loss, and tiredness, the most pronounced improvements among men are observed in drowsiness, tiredness, and appetite loss.

7.5 Conclusions Spanish Living Lab 5

In the literature review, several studies were identified that already report improvements in psychological symptoms associated with cancer. Our study confirms these previous findings with new empirical data. However, perhaps the most relevant contribution is that it also shows positive effects across the entire scale, including physiological aspects such as appetite loss, nausea, and pain, areas for which evidence remains limited.

When analysing the results of the live mini-concerts, we observed outcomes that differed from those obtained in the relaxation sessions. This suggests that different music therapy approaches may activate distinct therapeutic mechanisms and may not influence all symptoms in the same way.

Taken together, these findings highlight the importance of continuing and expanding research in this field. They show that music has clear therapeutic potential in hospital settings, but also that its effects depend on how it is delivered, the context in which it is applied, and the individual characteristics of each patient.

Ultimately, this living lab reinforces the need to develop more personalised and evidence-based music therapy interventions, ensuring that the most appropriate musical approach can be offered to each patient in the most effective and meaningful way.

7.6 References

Gallagher, L. M., Lagman, R., & Rybicki, L. (2018). Outcomes of music therapy interventions on symptom management in palliative medicine patients. The American Journal of Hospice & Palliative Care, 35(2), 250–257. https://doi:10.1177/104990911769672

Krishnaswamy, P., & Nair, S. (2016). Effect of music therapy on pain and anxiety levels of cancer patients: A pilot study. Indian journal of palliative care, 22(3), 307. https://doi.org/10.4103/0973-1075.185042

Peng, C. S., Baxter, K., & Lally, K. M. (2019). Music intervention as a tool in improving patient experience in palliative care. The American Journal of Hospice & Palliative Care, 36(1), 45–49. Doi:10.1177/1049909118788643

Ramírez, R., Planas, J., Escude, N., Mercade, J., & Farriols, C. (2018). EEG-based analysis of the emotional effect of music therapy on palliative care cancer patients. Frontiers in psychology, 9, 254. https://doi.org/10.3389/fpsyg.2018.00254

Vianna, M. N., Barbosa, A. P., Carvalhaes, A. S., & Cunha, A. J. (2011). Music therapy may increase breastfeeding rates among mothers of premature newborns: a randomized controlled trial. Jornal de Pediatria, 87, 206-212. https://doi.org/10.1590/S0021-75572011000300005

8 Finland Living Lab

Piia Moore, GT Musiikkiluvat Oy,m Finland, Espoo

8.1 Abstract

In addition to the first Finnish Living Lab, the second Finnish study aimed to examine the impact of music on customer experience, sales, brand fit, and employee experience and behavior in a retail environment. The month-long experiment was carried out in nine different retail locations across Southern Finland, with the objective of understanding how familiar (CMO-licensed) and unfamiliar (copyright-free) music affects customer experience, purchase intent, and buying behavior. In contrast to the first study, sales index data were not available, and the survey items regarding additional spending or noticing additional products did not reveal statistically significant differences between the two music conditions.

Consistent with the findings of the initial Living Lab, customers in the second study continued to perceive familiar (CMO-licensed) music as a better fit with the retailer's brand identity. Due to the limited employee feedback collected in the first Finnish Living Lab, it was not possible at that stage to draw conclusions regarding the potential effects of background music on employee satisfaction or employee–customer interactions. Although the number of employee responses remained modest in the second round as well, the proportion of responses relative to the total number of staff provides a sufficiently indicative view of employees' experiences during the intervention. Nevertheless, further research into a larger and more representative employee sample would be warranted to strengthen these findings.

In the second Living Lab, employees reported increased energy levels, a more positive influence on their overall mood, and a stronger perceived congruence between the music and the store environment in the familiar, licensed group than the unfamiliar copyright-free group.

8.2 Methodology

8.2.1 Experimental design

In the second Finnish study, the two independent variables consisted of familiar, copyrighted commercial music that customers or employees might recognize from radio or other media, and unfamiliar, royalty-free music commonly referred to as *elevator music*, which is not associated with any specific artist. A professional background-music provider developed the easy-listening setlists for both conditions. The playlists were designed to be as similar as possible in terms of ambiance and

tempo. Neither playlist was static; instead, both featured dynamically changing selections of tracks determined by predefined parameters. This approach ensured sufficient musical variety while maintaining consistency across conditions. The primary aim of this design was to isolate the effect of music familiarity, familiar (CMO-licensed) versus unfamiliar (copyright-free) music, rather than the influence of song variety.

Familiar (CMO-licensed) music was played in four locations, whereas unfamiliar (copyright-free) music was played in five locations throughout the one-month experimental period. All participating sites were part of a major national hardware retail chain in Southern Finland. The locations were purposefully selected to ensure that each condition included comparable stores, thereby improving the internal validity of the study.

8.2.2 Materials & procedure

The second study was conducted in nine hardware stores located in the southern part of Finland. The playlists for experimental conditions were curated by a specialist background-music company. The stores' sound systems consisted of non-adjustable speakers that played music consistently across the general premises of each shopping environment.

Throughout the study, customer feedback was collected using touchscreen stand-alone survey modules positioned inside the stores, typically near the cashier area and main exit. Employees were instructed to encourage customers to complete the questionnaire after finalizing their purchases and as they exited the store. The same questionnaire remained in use for the entire duration of the study. In addition, employees received a separate online survey distributed via email.

The customer questionnaire consisted of items assessing mood, shopping experience, perceptions of background music, brand evaluations, extra spending, and extra purchasing. No demographic data was collected from customers to ensure anonymity and ease of participation. Similarly, the employee questionnaire included items related to mood, perceptions of background music, brand fit, energy levels, and interactions with customers as well as some demographic information (age, genre, job title, education, and length of employment). Copies of both survey instruments are provided in the appendix.

8.3 Analysis and Results

8.3.1 Customer Data

8.3.2 Sample Characteristics

The customer dataset contained 354 respondents, all of whom were retained for analysis because each provided at least a mood rating and location information. Respondents were distributed across multiple store locations. To maintain anonymity and ensure a short survey, no demographic data was collected. However, given the nature of hardware store clientele, which includes both professional builders and DIY customers, the majority of visitors were assumed to be adult males. Among the respondents, 169 were in stores using familiar (CMO-licensed) music and 185 in stores using unfamiliar (copyright-free) music.

8.3.3 Customer Mood and Perceptions

Customers assessed their emotional state immediately after their purchase while still inside the store. Emotions were coded into –1 (negative), 0 (neutral), and 1 (positive). Most respondents reported positive emotions such as joy, enthusiasm, and trust. However, no significant differences in customer mood emerged between familiar (CMO-licensed) and unfamiliar (copyright-free) music conditions.

Table 8.1: Customer Mood Immediately After Purchase (Valence Recoded as -1, 0, 1)

Valence		Frequency	Percent
-1	DISAPPOINTED	9	2.5
1	ENTHUSIASTIC	69	19.5
-1	FRUSTRATED	12	3.4
0	INDIFFERENT	36	10.2
-1	IRRITATED	26	7.3
1	JOY	109	30.8
-1	SADNESS	10	2.8
1	SURPRISED	8	2.3
1	TRUSTING	75	21.2
	Total	354	100.0

Further analyses examined whether the music condition influenced customers' evaluations of perceived product quality, brand image, staff friendliness and competence, or perceived extra

spending and unplanned purchases. None of these variables showed statistically significant differences, indicating that background music type did not meaningfully alter customers' attitudes or self-reported purchasing behavior.

Table 8.2: Licensed versus non licensed music

Items	licenced_nonlicenced music	N	Mean	Std. Deviation
mood of the customer	0 NON-LICENCED	185	.6054	.74526
	1 LICENCED	169	.5444	.76344
perceived quality of the produce of the store	0 NON-LICENCED	112	4.1607	.94491
	1 LICENCED	138	4.0507	.95384
image of the store	0 NON-LICENCED	102	4.1275	1.04996
	1 LICENCED	134	4.1269	.90464
How friendly did store's staff seem during your visit?	0 NON-LICENCED	101	.8911	.20438
	1 LICENCED	132	.8750	.21290
perceived competence of the personel	0 NON-LICENCED	91	4.4066	.68277
	1 LICENCED	124	4.4113	.85551
extra product	0 NON-LICENCED	90	.4222	.49668
	1 LICENCED	122	.3689	.48448
extra spending	0 NON-LICENCED	85	.5059	.98348
	1 LICENCED	121	.4215	.98109

In the first Finnish retail study, however, we observed a different pattern, particularly in bookstores, where familiar (CMO-licensed) music had a positive effect on sales compared to unfamiliar (copyright-free) music. In the first Living Lab, we additionally had access to actual sales index data to compare with counterpart stores using unfamiliar (copyright-free) music, which strengthened the evidence that familiar (CMO-licensed) music can positively influence purchasing behavior.

8.3.4 Music Fit and Enjoyment

Two customer-related variables did show statistically significant differences. First, customers in the familiar (CMO-licensed) music condition perceived the background music as a better fit with the store's atmosphere, with a mean of 6.95 compared to 5.82 in the unfamiliar (copyright-free) music condition (scale 1–10). Second, customers rated the music as more enjoyable in the familiar (CMO-licensed) music condition, with mean scores of 0.70 versus 0.60 (scale 0–1). These findings suggest that licensed, familiar music enhances the overall environmental experience, even if it does not significantly affect customers' attitudes or purchasing intentions.

8.3.5 Employee Data

8.3.6 Sample Characteristics

The original employee sample consisted of 74 respondents. After data cleaning – during which participants with missing values on essential variables were removed – the final dataset comprised 54 employees distributed across nine store locations. The average age of respondents was approximately 41 years, and their average tenure was around 10 years. The sample was predominantly male (28 men, 20 women, and approximately 9% undisclosed). Educational levels reflected the practical and vocational background typical of employees in hardware retail environments and education wise the sample of employees is overall more practically trained.

8.3.7 Effects of Familiar (CMO-licensed) vs. Unfamiliar (Copyright-free) Music on Employees

Several statistically significant differences emerged between the familiar (CMO-licensed) and unfamiliar (copyright-free) music conditions. Employees exposed to familiar (CMO-licensed) music reported significantly greater awareness of the background music. The mean awareness score was 4.35 in the familiar (CMO-licensed) music condition compared with 3.74 in the unfamiliar (copyright-free) music condition (scale 1–5). Additionally, familiar (CMO-licensed) music was evaluated much more positively, with a mean rating of 0.54 compared to 0.33 in the unfamiliar (copyright-free) music condition (scale 0–1).

Familiar (CMO-licensed) music also had a clear positive impact on employees' well-being. Respondents indicated that it improved their mood more strongly (mean 6.13 vs. 4.04) and increased their energy levels (mean 6.44 vs. 4.43) relative to unfamiliar (copyright-free) music (scale 1–10). Furthermore, employees perceived familiar (CMO-licensed) music as a significantly better fit with the store environment, with a mean score of 5.75 compared to 3.39 in the unfamiliar (copyright-free) condition. Expressed as a percentage, these results show that familiar (CMO-licensed) music improved employees' mood by 33%, increased their energy levels by 31%, and enhanced the perceived fit of the music with the store environment by 41% compared to unfamiliar (copyright-free) music.

Items	licenced_nonlicenced music	N	Mean	Std. Deviation
awareness how aware of the music	0 NON-LICENCED	23	3.7391	1.21421
	1 LICENCED	31	4.3548	.87744

think_music What did you think of the music in the store last week?	0 NON-LICENCED	23	.3261	.25489
	1 LICENCED	32	.5391	.29175
mood_affect How did the music in the store affect your mood last week?	0 NON-LICENCED	23	4.04	3.007
	1 LICENCED	32	6.13	3.139
energy_affect How did the music played in the store affect your energy last week?	0 NON-LICENCED	23	4.43	2.997
	1 LICENCED	32	6.44	2.675
mus_fit How well did the music in the store fit the store's brand last week?	0 NON-LICENCED	23	3.39	3.071
	1 LICENCED	32	5.75	3.233

In contrast, variables measuring general feelings at work, respondents' mood at the time of completing the questionnaire, and customer-centric attitudes showed no significant differences between music conditions. These results cannot therefore be meaningfully interpreted.

Items	Licenced_nonlicenced music	N	Mean	Std. Deviation
Mean customer centric attitude	.00 unlicenced	23	8.9348	1.14618
	1.00 licenced	32	8.2891	1.24452
mood when filling out questionnaire	.00 unlicenced	23	.0870	.73318
	1.00 licenced	32	.1875	.73780
feeling positive negative at work last week	.00 unlicenced	23	.0870	.73318
	1.00 licenced	32	.1875	.73780

8.3.8 Summary of Results

Overall, familiar (CMO-licensed) music demonstrated a clear and consistent positive effect on employees. It increased their awareness of the music, improved their evaluations of it, enhanced their mood and energy, and was perceived as more suitable for the store environment. For customers, the effects were more modest. While familiar (CMO-licensed) music did not significantly influence mood, evaluations of the store, or behavioral intentions, it was rated as both more enjoyable and a better atmospheric fit for the store. These findings suggest that recognizable licensed background music

strengthens the perceived quality of the store environment, particularly from an experiential and atmospheric standpoint.

8.4 Conclusions

This study examined the effects of familiar (CMO-licensed) versus unfamiliar (copyright-free) background music on both employees and customers across nine hardware store locations in Finland. The second Living Lab results demonstrate that familiar licensed music produced consistently positive outcomes for employees, while its influence on customers was more limited and subtle.

For employees, familiar (CMO-licensed) music was associated with markedly higher awareness of the background music as well as more favorable evaluations of it. These differences extended to personal well-being: employees exposed to familiar licensed music reported better moods, higher energy levels, and a stronger perception that the music suited the store environment. These findings suggest that familiar (CMO-licensed) music contributes to a more positive and supportive working atmosphere, which may, in turn, enhance employee engagement and comfort during the workday.

Among customers, familiar licensed music did not significantly influence mood, perceptions of product quality, brand image, staff friendliness or competence, or perceived spending behavior in the second Finnish study. This indicates that while customers likely remain focused on their shopping objectives rather than the store's auditory environment, background music alone is not sufficient to alter core evaluations or self-reported consumer behavior. However, two experiential dimensions did differ significantly: customers perceived familiar (CMO-licensed) music as both more enjoyable and a better fit for the store's atmosphere. These findings point to an enhancement of the ambient shopping experience even if behavioral or attitudinal outcomes do not shift accordingly. In contrast, the first Finnish retail Living Lab results indicated influence in mood, brand image and spending behavior in favor of familiar (CMO-licensed) music in the customer study.

Taken together, the results indicate that familiar (CMO-licensed) music offers clear advantages for employees and meaningful atmospheric benefits for customers. While the impact on consumer behavior appears limited in the second Finnish study, improved environmental fit and increased enjoyment suggest that familiar (CMO-licensed) music can nonetheless strengthen the experiential quality of the retail environment. For organizations, these findings highlight the potential value of using licensed familiar music not only to support employee well-being but also to reinforce the store's desired ambience and overall customer experience.

8.5 Appendices:

8.5.1 Appendix: Survey for hardware store customers in Finland

Nro	Question	Option	Scale
1.	How do you feel right now, at this very moment?	ENTHUSIASTIC, JOY, TRUSTING, SURPRISED, INDIFFERENT, DISAPPOINTED, SADNESS, FRUSTRATED, IRRITATED	
2.	How would you rate the overall quality of store's product selection?	Excellent quality, Good quality, Moderate quality, Poor quality, Very poor quality	
3.	What kind of image do you have of the store brand?	Very positive image, Positive image, Neutral image, Negative image, Very negative image	
4.	How friendly did store's staff seem during your visit?	Amazing, Good, OK, Bad, Terrible	0 - Terrible, 1 - Amazing
5.	How would you rate the service person's competence and ability in a customer situation?	Excellent, Good, Moderate, Somewhat poor, Very poor	
6.	Did you buy any additional products that were not on your shopping list?	Yes, No	
7.	How much money did you spend during this shopping trip compared to your original plan?	Much more than planned, More than planned, Approximately as planned, Less than planned, Much less than planned	
8.	How enjoyable was the background music during your visit?	Amazing, Good, OK, Bad, Terrible	0 - Terrible, 1 - Amazing
9.	How well did today's background music fit the overall atmosphere of the store?	Not at all --------- Very well	0 - Not at all, 10 - Very well
10.	Is there anything else you'd like to add about your experience or this survey?	Open question	

8.5.2 Appendix: Survey for hardware store employees in Finland

Nro	Question	Option	Scale
1.	Did you work last week at the store?	Yes, No* (*end of survey if no)	
2.	Indicate how you have felt working at the store over the past week.	ENTHUSIASTIC, JOY, TRUSTING, SURPRISED, INDIFFERENT, DISAPPOINTED, SADNESS, FRUSTRATED, IRRITATED	
3.	Think about the past week as you answer the following statements. To what extent do you agree with each one?		
a	I always want to find out what a customer needs	Completely disagree ------ Completely agree	0 - Completely disagree, 10 - Completely agree
b	I like solving customers' problems	Completely disagree ------ Completely agree	0 - Completely disagree, 10 - Completely agree
c	I try to find out which product best suits the customer	Completely disagree ------ Completely agree	0 - Completely disagree, 10 - Completely agree
d	I like interacting with customers in the store	Completely disagree ------ Completely agree	0 - Completely disagree, 10 - Completely agree
e	I feel comfortable talking to customers	Completely disagree ------ Completely agree	0 - Completely disagree, 10 - Completely agree
4.	To what extent are you aware of the music played in stores?	Very aware, Quite aware, Moderately aware, Slightly aware, Not aware at all	
5.	What did you think of the music in the store last week?	Amazing, Good, OK, Bad, Terrible	0 - Terrible, 1 - Amazing
6.	How did the music in the store affect your mood last week?	Very negatively ------- Very positively	0 - Completely disagree, 10 - Completely agree
7.	How did the music played in the store affect your energy last week?	Not at all ---------- A lot	0 - Completely disagree, 10 - Completely agree
8.	How well did the music in the store fit X brand last week?	Not at all ------- Perfectly	0 - Completely disagree, 10 - Completely agree
9.	Which store do you work at?	Selection of store locations	

10.	How many years have you worked at X? Round to the nearest full year.	Open question	
11.	What is your current position / job title?	Open question	
12.	What is your highest level of education? If you are a student, please indicate what program you are currently enrolled in.	Higher university degree (Master's degree), Lower university degree (Bachelor's degree), General upper secondary education (High school), Vocational education and training, Comprehensive school (Basic education)	
13.	Which gender do you identify with most?	Female, Male, Non-binary, I prefer not to say	
14.	What is your year of birth?	Open question	
15.	Finally, would you like to share any thoughts or questions about the music in the store or the survey?	Open question	

9 International Living Lab: The RAAP/PPI case

9.1 Introduction

In deliverable 4.2 (Dashboard for ecosystem modelling – version 2) we have introduced the international living, namely the RAAP/PPI verdict. In that same deliverable, we already showed the *e³value* model for the case at hand (actually two models: one model that represents the situation before the verdict, and one model that covers the situation after the verdict). In this deliverable, we revisit the RAAP/PPI, but now with real data rather than hypothetical data.

9.2 Research setup

The aim of this exercise is to find out whether the *e³value* models are sufficiently precise, e.g., to inform policy makers to take corrective actions. For this purpose, we develop (slightly adapted) *e³value* models for the situations before and after the RAAP/PPI verdict. Then, we quantify the models using a dataset from the Dutch Living Lab, specifically the SENA data on performers of recordings. The *e³value* tooling is then used to calculate the effect of the RAAP/PPI verdict, before and after the verdict, for the following classes of rights holders:

- **Featured** artists with a nationality of one of the countries that **signed** the Convention of Rome in 1961.
- **Non-featured** artists with a nationality of one of the countries that **signed** the Convention of Rome in 1961.
- **Featured** artists with a nationality of one of the countries that **did not sign** the Convention of Rome in 1961.
- **Non-featured** artists with a nationality of one of the countries that **did not sign** the Convention of Rome in 1961.

SENA has an accurate calculation of the dataset at hand: it provides a quantified view of money allocated to Rome Convention performers and non-Rome Convention performers. We compare the results of the model-based *e³value* calculation with the SENA reference calculation.

9.3 The RAAP/PPI case

We have explained the RAAP/PPI case already in Deliverable 6.4. We summarize the explanation about the case below to make this document self-contained.

The RAAP/PPI case results from a conflict between RAAP (the Irish CMO representing performers) and PPI (the Irish CMO representing phonogram producers). In Ireland, the collection of the single equitable remuneration for the broadcasting and public performance of music recordings is done by PPI. Whereas in some other EU countries, the equitable single remuneration collected is split 50/50 at source between producers and performers, PPI does not automatically transfer 50% of its collection

to RAAP for further distribution to their performers (and performers of CMOs with whom they have bilateral representation agreements). The Irish law allows PPI to decide what remuneration an individual performer is entitled to and to oblige RAAP to 'claim' these amounts track by track, performer by performer.

There are many cases in which claims by RAAP are refused. One of them concerns performers on US music recordings. Although PPI calculates a value for these music recordings, it does not allow RAAP to claim a share of this value for the performers on these recordings. As such, the full value is paid out to the US record label. PPI claims that they are merely applying Irish national law, which indeed explicitly excludes non-EU/EEA performers from the scope of the right to equitable remuneration.

RAAP initiated proceedings against PPI, and the Irish court saw itself incompetent to respond to the question of whether or not PPI was entitled to refuse claims by RAAP on non-EU/EEA music recordings. Following a request from the Irish High Court, the case was presented to the Court of Justice of the European Union, which ruled on the matter in its judgment of 8 September 2020 (C-265-19).

In a ruling ultimately motivated by the European Charter of Human Rights, the Court found the Irish legislation to be not conforming with EU norms in limiting the right to receive equitable remuneration to nationals of the EU/EEA only. It concluded that the relevant Directive, considered in the light of international treaties that impose national treatment, only provides the EU with the right to limit this principle.

The Court's decision has severe consequences for the international exchange of remuneration among performer and producer CMOs. Although Ireland is the only EU member state that has legislation that explicitly excludes non-EU/EEA performers from this remuneration, there are many member states that apply the principle of reciprocity and only provide the right to equitable remuneration to performers and producers from countries that offer this type of remuneration to their nationals.

The impact is most significant in the exchange of remuneration with the US. The US does not offer equitable remuneration for the public performance of music recordings, but US recordings represent a very large part of the music used as background music by businesses in the EU. A direct implementation of the Court's decision without a proportionate increase of the tariffs applied by the CMOs will result in a net loss of more than €1bn over the next decade to the US alone, as calculated by IMPALA, the European federation of independent record labels.

The situation caused the EU Commission to conduct a study on the international dimension of the single equitable remuneration right for phonogram performers and producers and its effect on the European Creative Sector, which was published in 2023. The study pointed out the complete lack of

harmonization at the EU concerning the international dimension of the equitable remuneration, but the EU still has to make a clear decision on how it wants member states to respond to the CJEU ruling.

9.4 The RAAP/PPI case in *e³value*

9.4.1 Before verdict

Figure 9.1 presents the *e³value* model that captures the situation before the RAAP/PPI verdict. There is a venue (here: the Retail Store) that plays music in the store, e.g., to attract customers. To do so, the Retail Store pays a fixed amount of money to the collecting CMO.

The *customer need* in the collecting CMO, annotated with "seconds played", represents the need to pay for each second a recording was played. In the calculation, we assume that all money collected by the CMO is paid to the rights holders[2]. The need is quantified by the number of seconds of music played in the Dutch Living Lab. This data is obtained from the reports of the background music provider.

The claiming CMO receives money from a collecting CMO for the number of seconds that the recordings were played. In reality, there can be many collecting and claiming CMOs; in this case, we assume that there is only one. Also, we assume that all rights holders have given a mandate to this CMO to clear performing rights. Again, this is not always true in reality, but for the purpose of analysis, it has no consequence.

The claiming CMO decides whether a recording is *rights-bearing*. Before RAAP/PPI, and in the Netherlands, a recording is rights-bearing if the recording was produced in a country of the Rome 1961 Convention[3]. Before the RAAP/PPI verdict, this resulted in the situation that some recordings are rights-bearing, and others are not.

The claiming CMO considers the rights holders for each rights-bearing recording. We consider two classes of rights holders, namely featured artists and non-featured artists[4]. This is reflected by the OR dependency in the *e³value* model, inside the claiming CMO. Each type of artist gets points for a recording: a featured artist gets 5 points and a non-featured artist gets one point, with the constraint that all featured artists are assigned minimally 50% of all points.

The featured- and non-featured artists are paid, depending on the number of seconds their recording was played, and taking into account the number of points they have in relation to the recording at

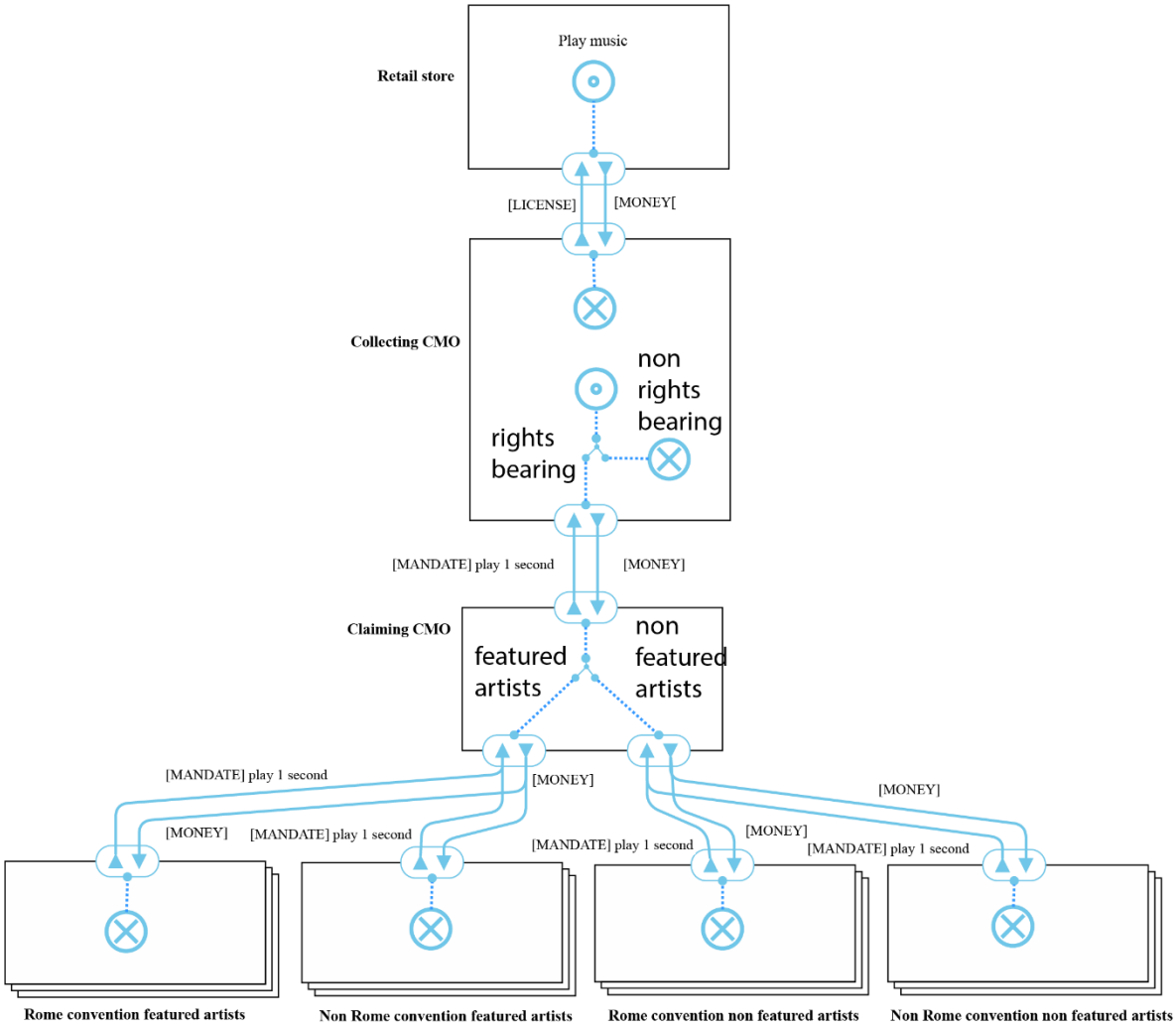
[2] This is not entirely correct, as most CMOs charge an administration fee. This fee is not considered.
[3] Rights-bearing is interpreted differently, even by Rome Convention countries.
[4] There is a third class, namely conductors. They are left out of the analysis.

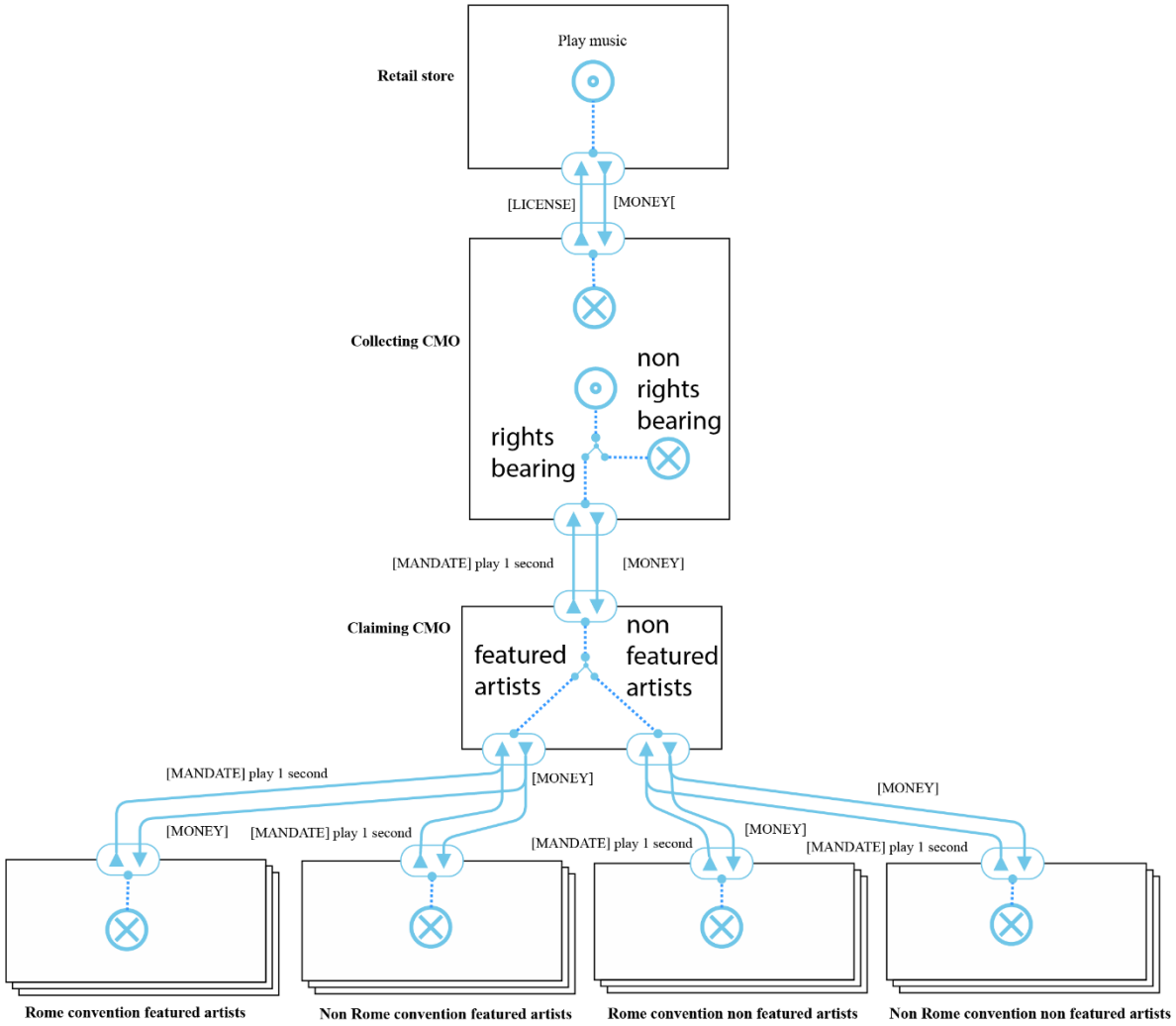
hand. For both kinds of artists, there are two types: artists with a nationality of a Rome Convention country or a non-Rome Convention country [5].

It is important to understand that performers with a nationality of a non-Rome country can still get money in the pre-RAAP/PPI verdict situation, namely if such a performer is a rights holder of a recording that was produced in a Rome Convention country.

Figure 9.1 An *e³value* model for collecting and claiming recordings played in the Netherlands, and paying to rights holders.

[5] We do not consider artists who have both a nationality from a Rome and non Rome Convention country.


Retail store
Play music
[LICENSE]
[MONEY[
Collecting CMO
non rights bearing
rights bearing
[MANDATE] play 1 second
[MONEY]
Claiming CMO
featured artists
non featured artists
[MANDATE] play 1 second
[MONEY]
[MONEY]
[MANDATE] play 1 second
[MANDATE] play 1 second
[MONEY]
[MONEY]
[MANDATE] play 1 second
Rome convention featured artists
Non Rome convention featured artists
Rome convention non featured artists
Non Rome convention non featured artists



9.4.2 After verdict

The RAAP/PPI verdict changed the right-bearing criterion. Effectively, all recordings are rights-bearing, independent of the country where the recording was produced. This means that all recordings that are played are eligible for receiving money, and so are their rights holders, regardless of their nationality.

What qualitatively happens is that the *same amount of collected money*, as compared to before the RAAP/PPI verdict, has to be divided *over more rights holders*. CMOs can respond on this in different ways: for example, they can increase the license fee, such that the original rights holders of Rome Convention recordings still get the same amount of money. Or they can not change the license fee. We assume the latter. As a result of the RAAP/PPI verdict, *all recordings* that are produced in non-Rome Convention countries are attributed money, and consequently their rights holders. In many cases, these rights holders also have a non-Rome Convention nationality, but not always.

9.5 Results

For the data set of the Dutch Living Lab, SENA calculated the division of money over rights holders, either featured or non-featured, and Rome Convention nationality, or non-Rome Convention nationality. Similarly, the *e³value* model was used to calculate the revenues for the four stakeholders. The actual outcomes of the calculation are confidential, so we can disclose them in this deliverable. We compared the calculation of SENA with the calculation based on the *e³value* model. Deviation was less than 1%. The (small) deviation can be explained by some minor modelling simplifications of rare cases in the *e³value* model, whereas the SENA calculation takes into account all these exceptional cases too. Also, the SENA model deals with the situation that after a few years, unknown rights holders show up to claim their earnings. To do so, the model of SENA creates money buffers to pay such rights holders afterwards. After some years, the unclaimed buffers are paid to the known rights holders. This complexity was not considered by the *e³value* model. As the calculation that was made using the *e³value* model comes very close to SENA's calculation, the model is reliable, for example, for decision-making by policy makers. The RAAP/PPI case serves as an example of how the *e³value* model can be used to assess the impact of potential policy decisions. It also highlights the importance of *ecosystem* analysis, rather than considering the individual actor only.

10 Experimentation ToolKit

10.1 Introduction

The execution of the quantitative experiments is quite expensive. To allow for easy replication of the experiments, we have developed an Experimentation ToolKit (ETK). The ETK is a software platform to facilitate experiments like the quantitative experiments that were done in the Music360 project.

10.2 Functionality

The ETK is largely inspired by the Dutch Living Lab. It provides the following functionality:

- Multiple experiments (types), also as templates for future experiments.
- Design of experiments with the essential parameters, such as the participant groups, controlled variables such as tempo, genre, and language of music, and dependent variables, including various types of these variables.
- Access to document(s) that explain the experiment in more detail.
- Data collection: importing Excel spreadsheets with data from the experiment.
- Statistical tests: T-test and ANOVA.
- Reporting on the experiment.

10.3 Implementation and testing

The ETK is built in Spring Boot (backend) and React (frontend). It can be deployed using Docker. Testing is done by replaying the first Dutch Living Lab and comparing the results. The ETK resulted in the same conclusions compared to the manual conclusions.

10.4 Demonstration scenario

Below, we provide a walk-through of the ETK.

After logging in, the user sees the studies available. In Figure 1, the study of the first Dutch Living Lab is shown. There is a document that explains the experiment design, which the user can consult. Also, the factors that can be varied are shown (here, the tempo of the music and the ability to influence the playlist by the employee). Figure 10.2 shows that these variables can have predefined values (e.g., slow and fast music, and choice and no choice for the playlist).

The ETK supports the survey as the instrument for data collection. Figure 10.3 illustrates how such a survey is created. Executing the survey falls outside the scope of the ETK because there is a large variation in the tooling used. The ETK can import the results of a survey, as can be seen in Figure 10.4.

Once the data from the survey is imported, the user selects the conditions to be used in the T-test or ANOVA test (Figure 10.5). Figures 10.6 and 10.7 show how the dependent variables are selected based

on the earlier imported data. Then the some test input (here the confidence interval) is given, see Figure 10.8, and the test can run. Finally, Figure 10.9 shows how the result of the test is presented to the user.

Figure 10.1 Studies and experiments

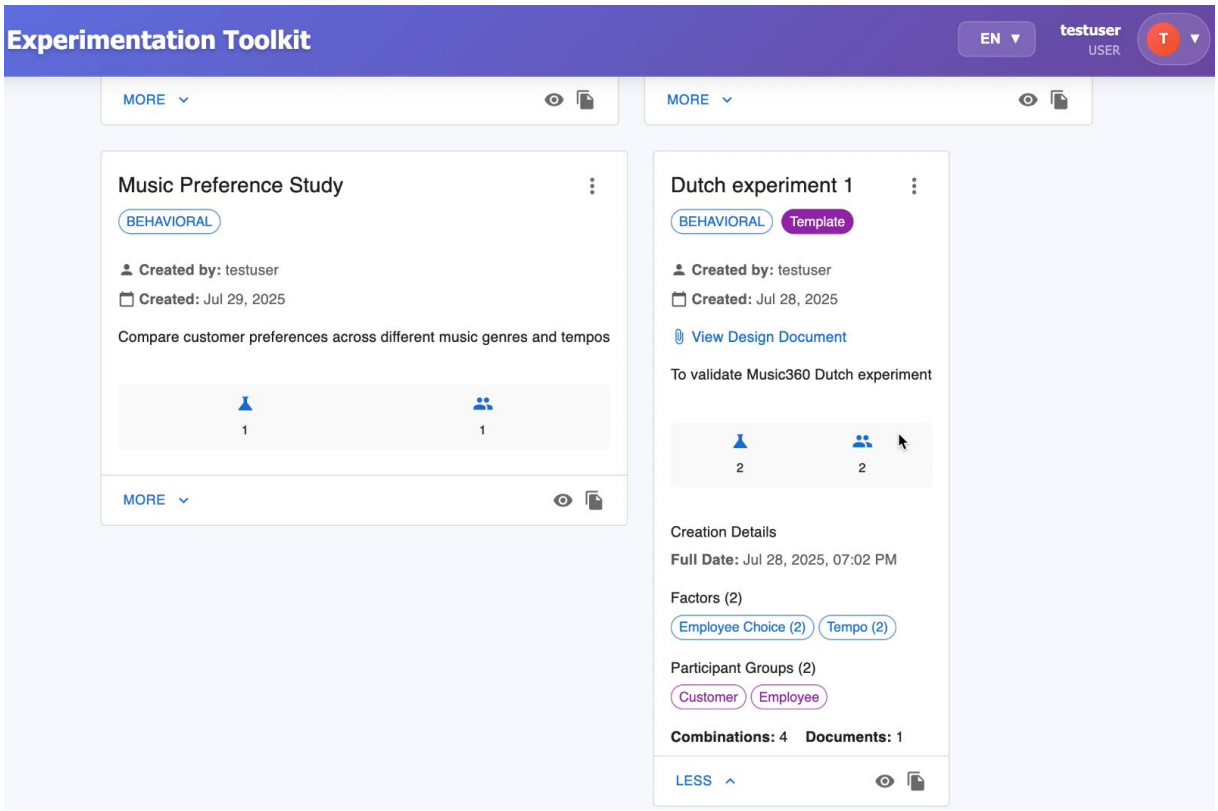


Figure 10.2 Operationalization of the variables

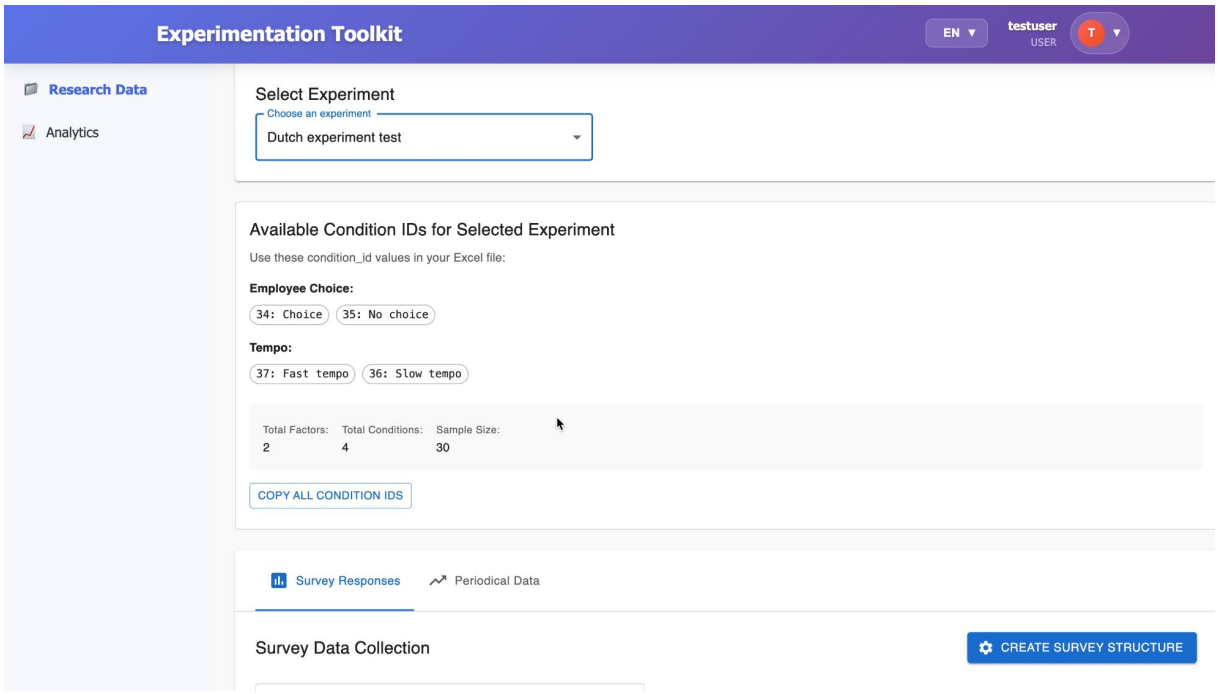


Figure 10.3 Survey creation

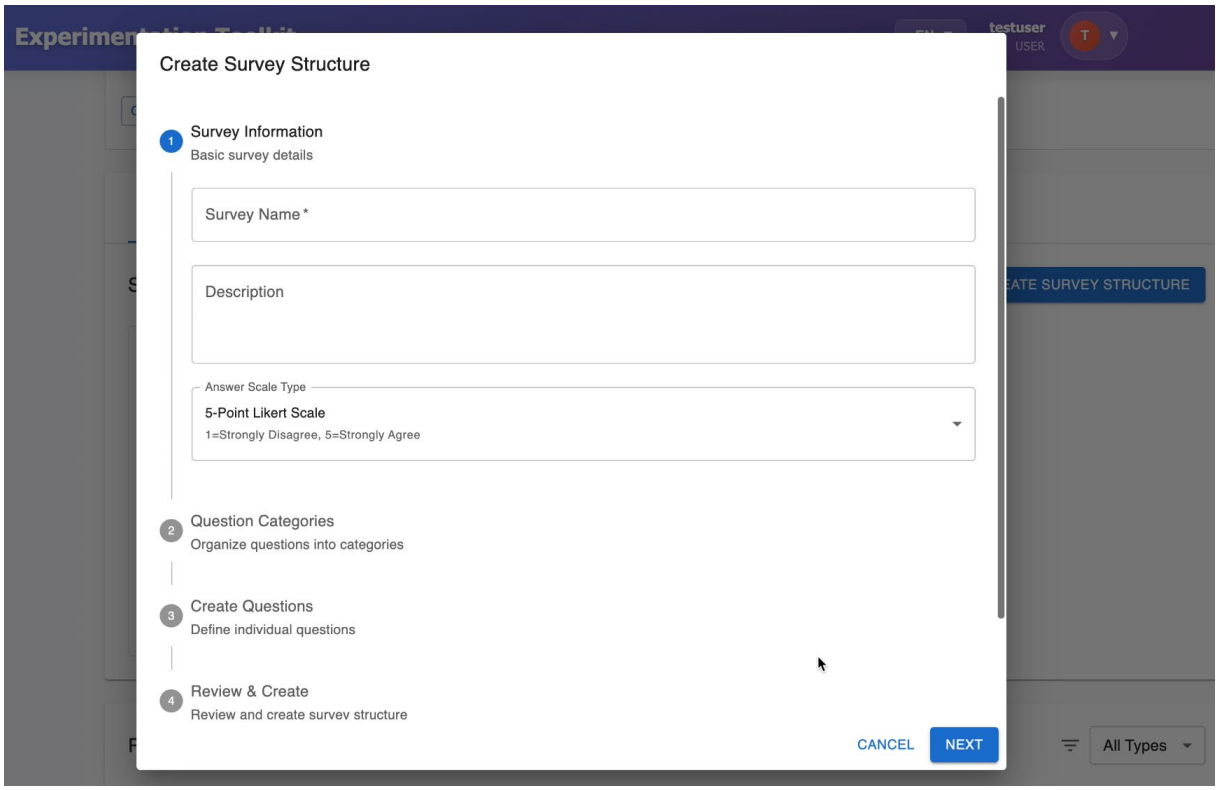


Figure 10.4 Importing survey results

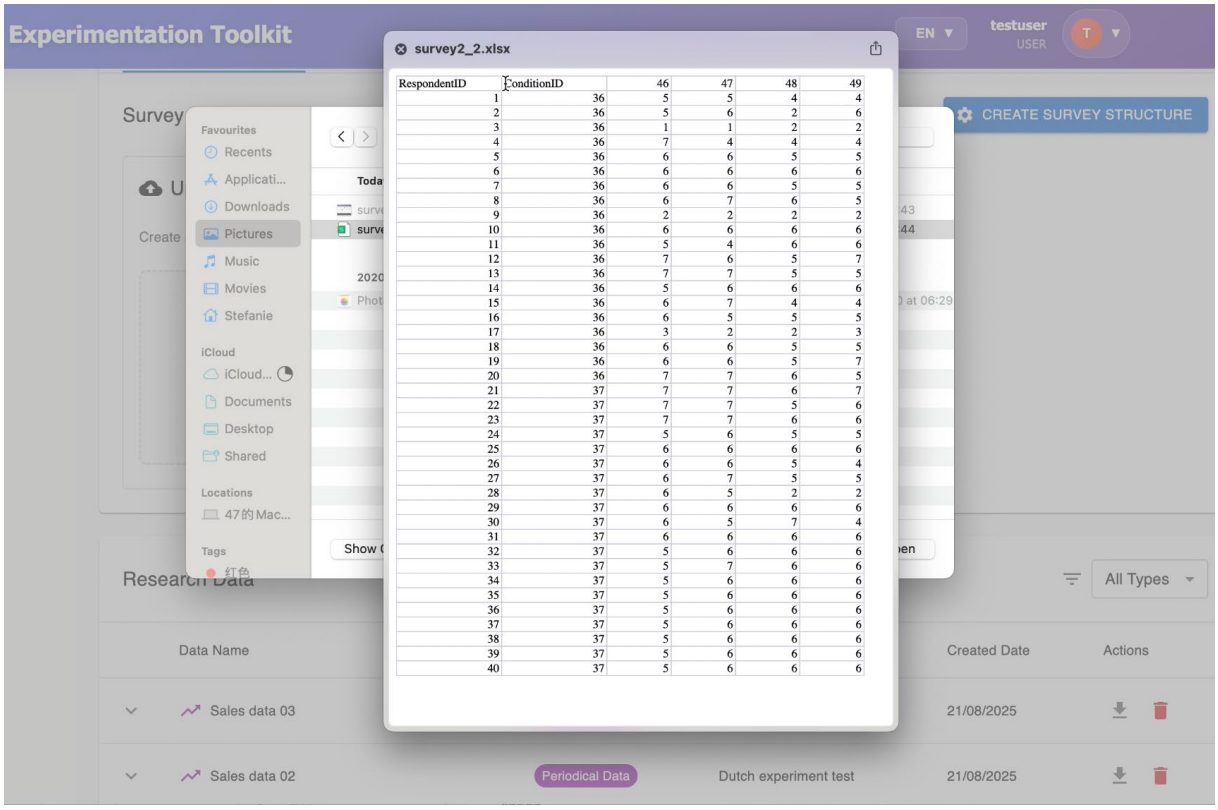


Figure 10.5 Selecting the conditions for analysis

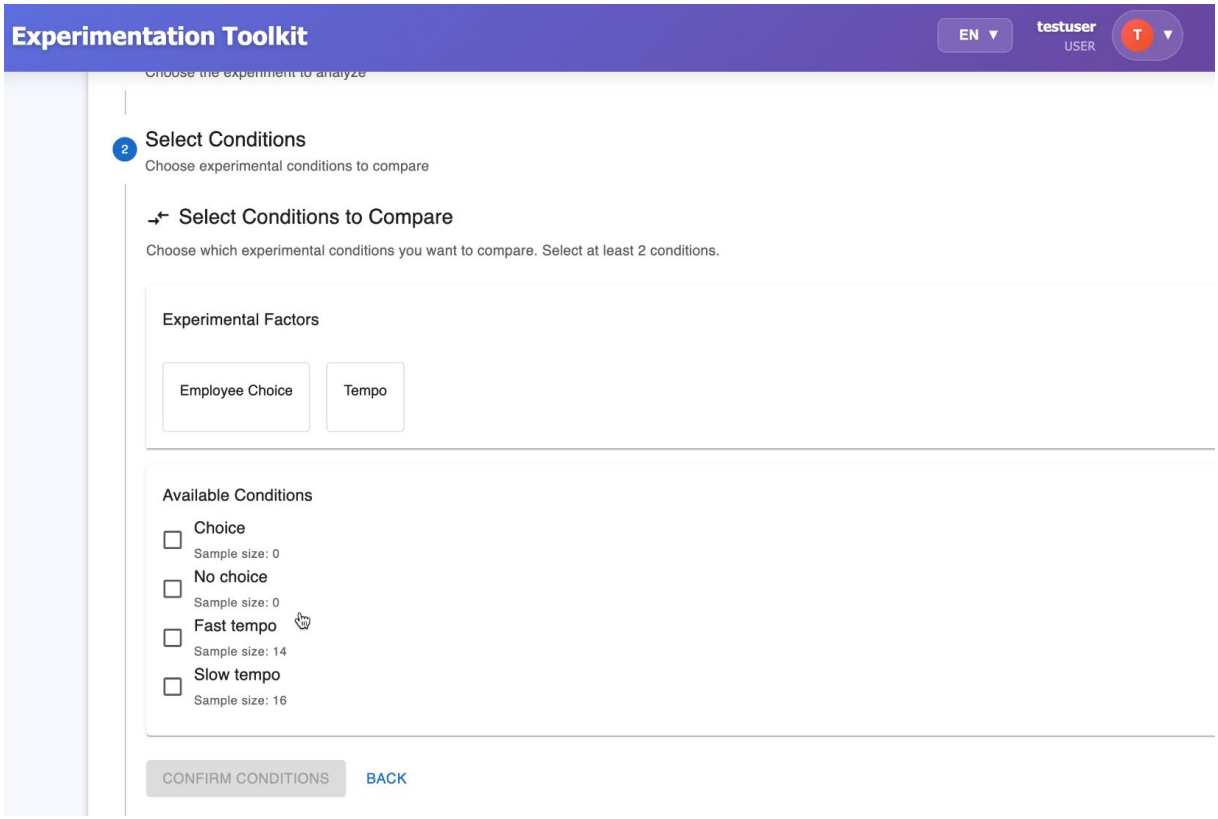


Figure 10.6 Selecting the dependent variables

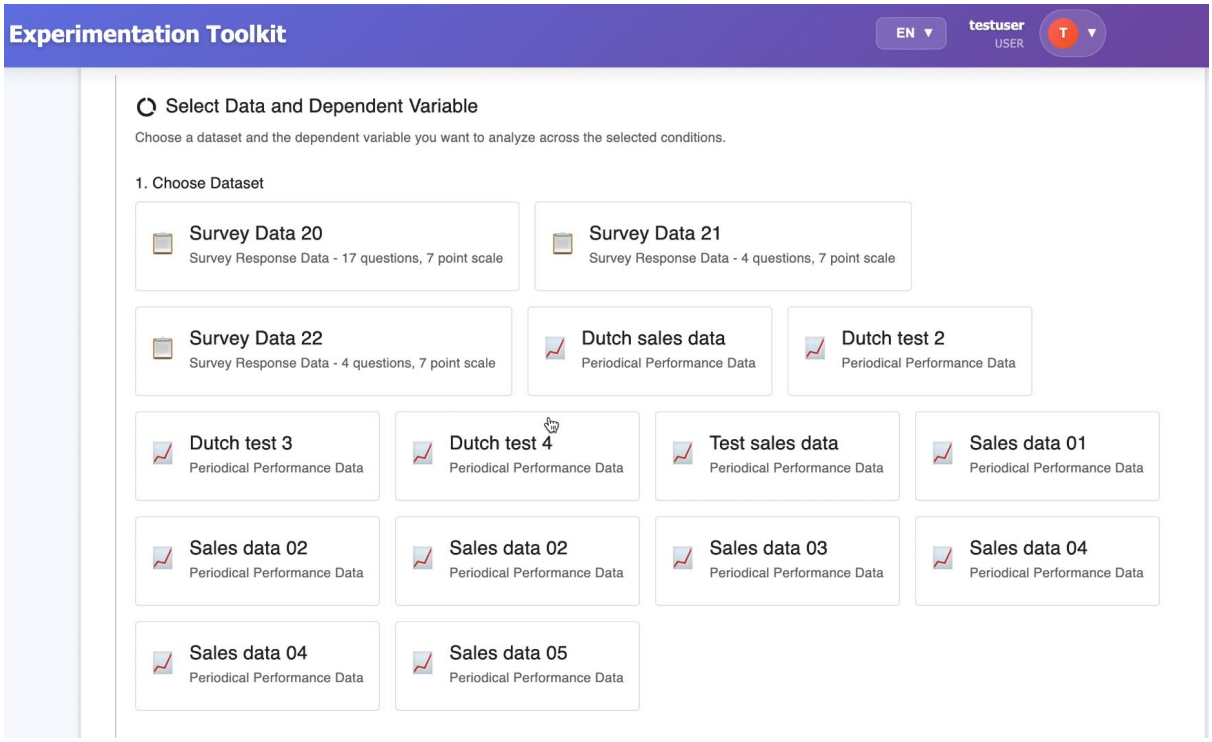


Figure 10.7 Selecting the conditions for analysis cont'd

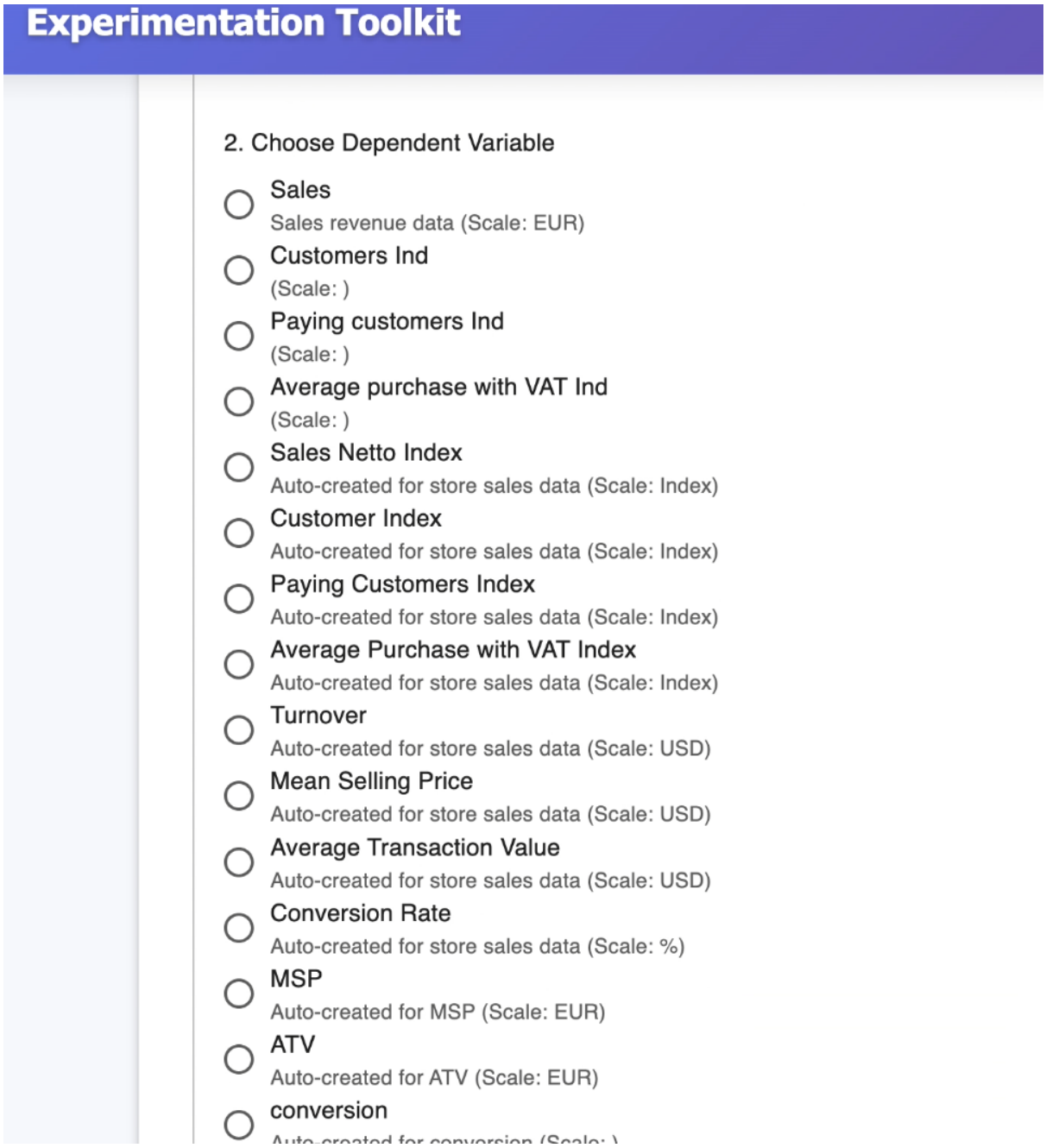


Figure 10.8 Give confidence interval and run the test

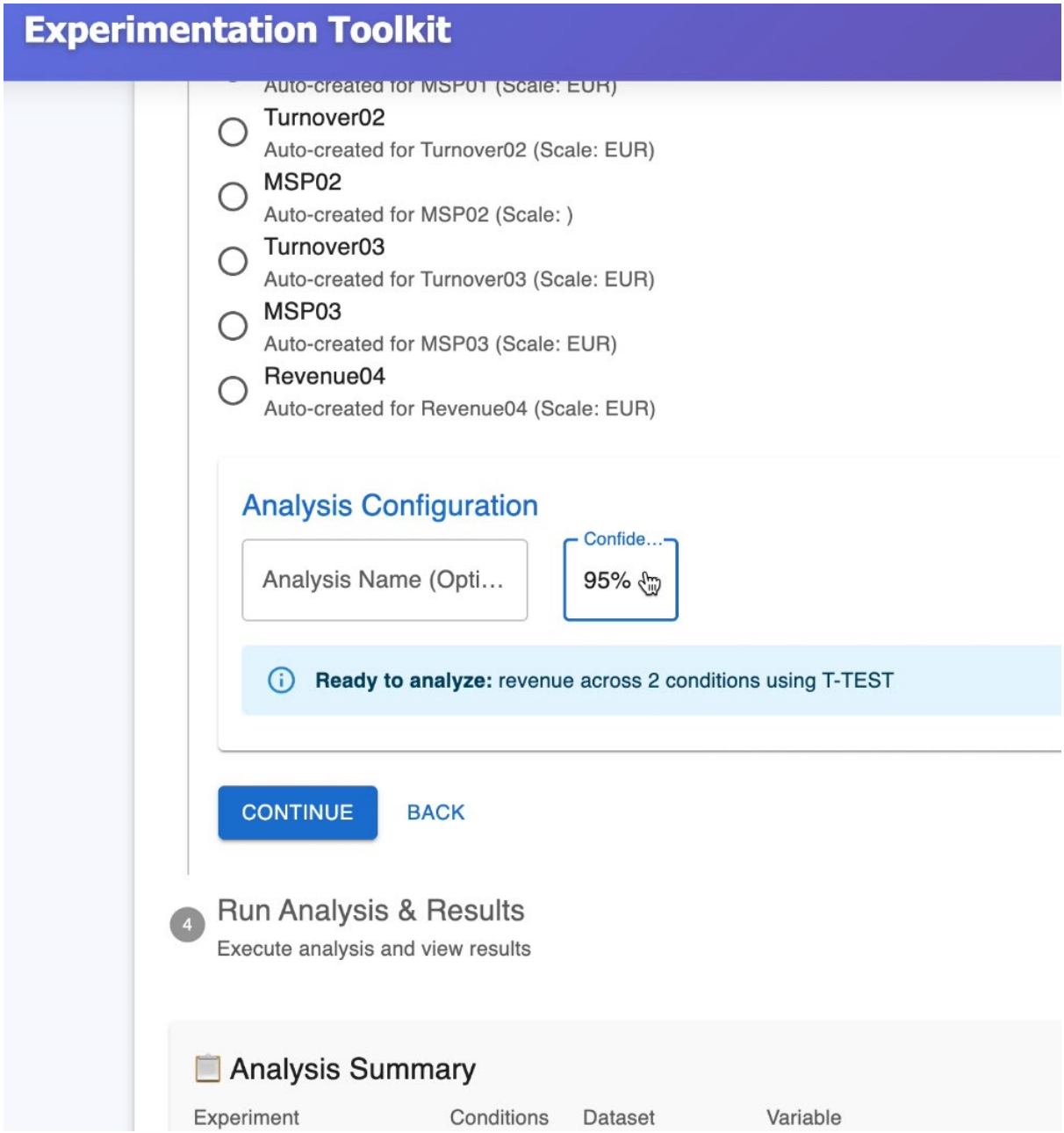
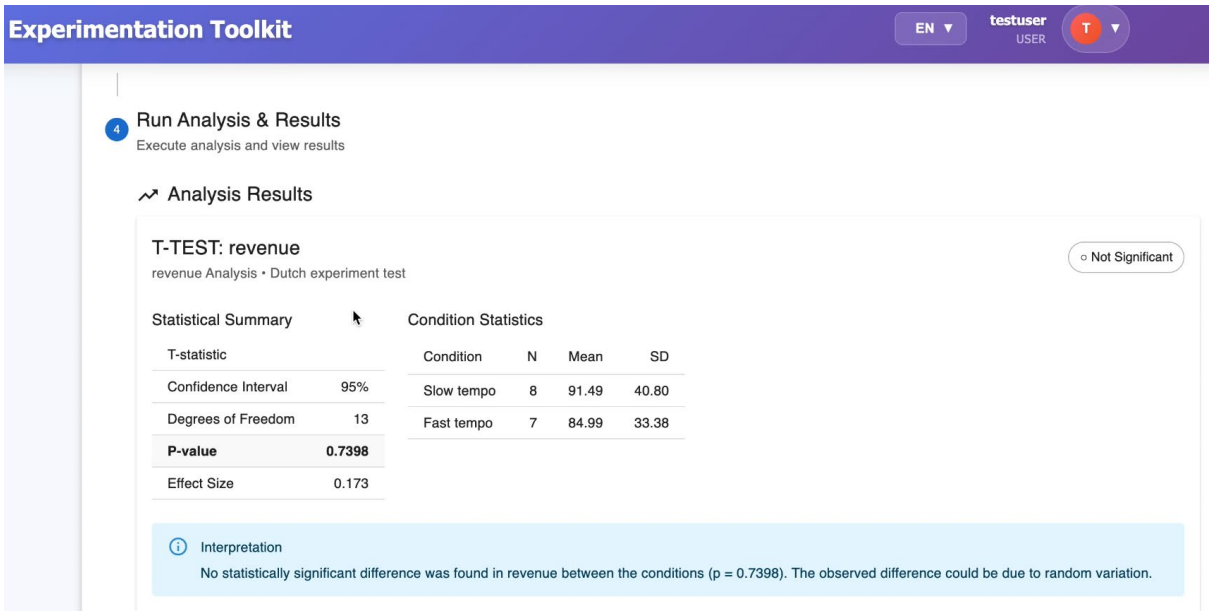


Figure 10.9 Results of the test



11 Conclusion

11.1 Overview

The MUSIC360 Living Labs represent one of the most extensive multi-country investigations into the value, functions, and impacts of music within real-world commercial, cultural, and public settings. Conducted across Portugal, Ireland, Finland, the Netherlands, and Spain, the studies collectively demonstrate that music is not merely an atmospheric backdrop but a consequential component of organisational strategy, employee experience, customer behaviour, cultural value, and rights-management systems. While each Living Lab was designed around distinct research objectives, the cross-country analysis reveals several shared patterns and important contextual divergences.

11.2 Cross-Country Comparative Insights

11.2.1 Music Familiarity and Employee Well-Being

- A key finding across Finland, the Netherlands, and Ireland is the consistent and pronounced influence of music on employees.
- In Finland, familiar, licensed music significantly enhanced employees' mood, energy, awareness, and job satisfaction.
- In the Netherlands, slower music improved employee affective states, which in turn increased job satisfaction, even though employees were not always consciously aware of the effect.
- In Ireland, music was repeatedly identified by managers and staff as central to morale, energy levels, and productivity, especially during high-pressure service periods.

Across all three countries, employees proved more sensitive to background music than customers. This suggests that music constitutes a critical, yet often under-recognised, element of the internal services and workplace climate.

11.3 Customer Responses: Contextual Variability

Customer behaviour proved more heterogeneous and context-dependent.

- In Finland, familiar music improved perceived atmosphere and enjoyment but did not alter spending or attitudes in hardware retail.
- In the Netherlands, tempo had no measurable impact on turnover or transactions, even in a large, controlled field experiment.
- In Ireland, however, qualitative insights indicated that in hospitality environments, where atmosphere is central to the service offering, music influences dwell time, spending, and customer retention.

Collectively, these findings suggest that music's behavioural effects on customers are strongest in experiential or hedonic settings (bars, restaurants, cultural venues) and weakest in functional retail spaces (hardware, cosmetics, general merchandise).

11.3.1 Rights Allocation: Evidence from Portugal

The Portuguese Living Lab provides a novel contribution through its focus on rights-distribution systems.

- Venue repertoires diverged substantially from broadcast references.
- However, the shared repertoire, though small in size, contained the most intensively used recordings, thereby limiting the distributional distortion created by missing long-tail content.

This indicates that while proxy-based broadcast systems miss significant venue-specific repertoire, they still capture much of the high-impact material. The findings support a hybrid rights-distribution model, combining broadcast data for high-rotation works with venue-level monitoring to capture long-tail and sector-specific usage.

11.3.2 Cultural, Social, and Emotional Value of Music

The Spanish Living Labs broaden the analytical lens by examining non-monetary values of music.

- In supermarkets, employees emphasised music's role in mood regulation, productivity, and cultural identity.
- In cultural events, music's cultural and ethical value strongly correlated with authenticity, memorability, and participant loyalty.
- In healthcare settings, both recorded music and live mini-concerts produced clinically meaningful improvements in anxiety, pain, appetite, sleep, and overall well-being among cancer patients.

These results demonstrate that music contributes significantly to social cohesion, cultural meaning, emotional well-being, and ethical engagement, revealing forms of value often overlooked in economic or commercial analyses.

11.3.3 Strategic Music Curation in Hospitality

Ireland's Living Lab provided the clearest example of strategic, organisation-wide music curation.

- Music was deliberately tailored to brand identity, target demographics, time of day, and customer expectations.
- Venues used music dynamically to influence customer flow, dwell time, and atmosphere, and to differentiate themselves in a competitive hospitality market.

Compared with other countries, Ireland demonstrates the highest level of intentional music management, positioning music as a core strategic asset rather than a peripheral aesthetic element.

11.3.4 Key Cross-Study Findings

Across all participating countries, several overarching conclusions can be drawn:

- Music has a stronger and more consistent impact on employees than customers, with measurable consequences for mood, energy, satisfaction, and workplace climate.
- Customer behavioural effects are context-specific, emerging most strongly in hospitality and cultural settings and minimally in utilitarian retail environments.
- Evidence-based rights distribution is technically feasible and can improve fairness, but optimal models will require hybrid proxy-monitoring systems.
- Music carries substantial non-monetary value, shaping authenticity, emotional well-being, productivity, cultural identity, and participant loyalty across a range of settings.
- Strategic music curation amplifies value, particularly when aligned with brand positioning, demographic targeting, and venue purpose.

11.3.5 Overall Conclusion

The MUSIC360 Living Labs collectively demonstrate that music plays a multifaceted role in contemporary public life. Its value is simultaneously economic, experiential, cultural, and emotional. By integrating advanced data-collection methods, behavioural research, qualitative inquiry, and rights-metadata analysis, the programme provides compelling evidence that music should be treated as a measurable, optimisable, and strategically significant component of venue operations, cultural practice, and well-being provision.

The cross-country findings underscore the importance of continuing to develop evidence-based approaches to music management, rights allocation, and policy design. As the Living Labs demonstrate, the more precisely we understand how music functions in real-world settings, the more effectively we can harness its value, for organisations, workers, customers, cultural participants, and society at large.