



# SMARTVINO project: When wine can benefit from ICT

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## Abstract

SMARTVINO project is devoted to the study and implementation of innovative services able to convey information related to wine and its traceability to costumers and consumers. The basic idea is to realize a simple and user-friendly tool, addressed to all kind of users and therefore immediately effective for everyone. SMARTVINO system allows users to take a photo of the previously marked company logo, depicted on the wine label, by a ordinarily known smartphone and then redirected to lots of detailed information related to the wine they are buying or drinking. Contents can concern the productive process, the vine variety the wine is made by, the geo-spatial localization of the vineyards, recommendations about which course is the most appropriate to be coupled with the wine, etc; in general, all the information or suggestions the producing winery wants to share with its customers. Such information can be in form of text, images, videos and web pages.

The project is still on-going at the date of writing. Next activities will be dedicated to draft a detailed plan for the commercial use of results. This paper is devoted to present the outcomes of the project and how these can be exploited in wine scenario.

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**Keywords:** ICT; Wine; Smartphone

## 1. Introduction

Technology has transformed our lives in almost all the aspects of our beings: just think about the pre-internet era and you will feel like it is part of ancient history, or about mobile phones, in the absence of which life seems now to be unfathomable. Nowadays, information is instantly available and sharable with virtually anyone on the planet. But the question by anyone in the marketing business, also and especially for wine, is if instincts and desires have been reshaped.

In Halstead (2013), the author tries to give an answer, also exploring the connection of social media with wine and wine-

consumers: it is a widespread opinion that wine producers have unprecedented opportunities to expand their markets.

The current technological disruption in the wine industry and the impact of technologies on wine purchases has been also inquired in Higgins et al. (2014), with particular attention to mobile wine applications (apps) and QR codes. Results demonstrate that wine connoisseurs or experts are more likely to employ technology when they are going to purchase some wine. Moreover, the adoption of QR codes and applications into the wine purchase decision is dependent on the ease of use and on the perceived usefulness of technology, while less involved wine consumers are harder to find the value and usefulness of applications.

In this environment has been conceived the SMARTVINO project,<sup>4</sup> which is intended to promote wine and its tight relationship with Tuscany region and its landscape, culture, history and traditions. This is accomplished by the study and the realization of an innovative tool able to convey to a

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customer information or services which can be specific and differentiated concerning the product he/she is buying or consuming. The same instrument can be at the service of the product traceability, which is an important aspect in all fields, even more in the wine and food ones, where the whole production chain has to be guaranteed for the safeguard of the consumer and his/her health. The main aspect has been considered is the ease-of-use of the proposed tool, being it a way to reach the majority of the whole population and not only a restricted more “technologized” subset of it; no less importance has been posed also on the immediacy information are given to the user.

The simplest choice to fulfill these constraints is the use of a smartphone: this is a well-known device, highly versatile, having own processing capabilities and able to be connected to WiFis and data mobile nets. Smartphones are pervasive among teenagers and young people; elders are less addicted to them, but the most are anyway able to use almost all the functions smartphones put at disposal.

The reference scenario is a customer shooting a photo of the producer's logo, depicted on the wine label, by SMARTVINO app previously installed on its own smartphone; after that, the user is redirected to the various multimedia contents the producer has chosen to share, such as images, texts, web pages, videos. The app has been tested giving information related to wine and to its relationship with the Tuscany Region, its culture and traditions, but they can be whichever; SMARTVINO could be even devoted to wine traceability by linking consumers to trusted authorities guaranteeing the productive chain.

Generally speaking, users can benefit from ICT, throughout SMARTVINO app, both before and after the purchase of a wine bottle. In the pre-purchase stage, as well as in the pre-drinking stage, users can check the trustworthiness of the producing farm, can comment on the wine, can verify the correct match with food they are going (or would like) to eat, can be ensured about the provenance by a trusted traceability system. In the post-purchase (drink) stage, they can comment about the wine, find where to buy, send questions to the farm.

The proposed tool is based on digital watermarking: by means of it, it is possible to insert an information (*watermark* or *code*) in an image or in a part of it, such as the logo of the producing farm; the introduced alterations are not perceivable by the human eye, thus the watermark turns out to be invisible. The code can be subsequently recovered by shooting a photo via one's own smartphone. The code has been previously associated to an external link, thus lots of chosen information can be displayed on the smartphone screen; the same code can be also used to launch services onboard the smartphone.

The proposed approach is intentionally simple and immediate; nonetheless, on the opposite side, it faces with some major issues due to the physical print and location of the label on the curve surface of the wine container. In particular, after the digitally watermarked label is printed and stuck on the wine bottle, it has to be acquired by the smartphone camera: it is possible to argue that all these processes introduce severe distortions that make the code to be barely recovered. A note has to be posed also on the position of the camera with respect

to the label: the geometrical distortion induced is in the 3D space, inducing in turn several degrees of freedom that reduce the ease of code recovery.

The paper is organized as follows: some existing techniques to retrieve information from images are presented in Section 2, while in Section 3 a particular attention is devoted to the watermarking scheme; some specific requirements and the final chosen architecture are presented in Section 4. Conclusions and ideas for future works close the dissertation.

## 2. Information coding technologies

*Information theory* studies the transmission, processing, utilization, and extraction of information; such information can be thought of as a possible message which has to be delivered from the source to the receiver. Information theory is closely associated with the so-called *coding theory*, wherein messages are modified following explicit methods to become *codes*, to increase their efficiency and reduce error in communications. Information theory is also used in intelligence gathering, gambling, statistics, and even in musical composition; for what concerning to our framework, information theory is used for information retrieval, that is to retrieve information from a particular medium.

For the needs of SMARTVINO framework, several information coding techniques have been inquired and the most relevant ones are recalled in this section: all of them could be applied to SMARTVINO needs, though each of them presents different limitations that will be discussed hereafter.

### 2.1. QR code

QR-code can be regarded as the evolution of the bar-code and can be seen in Fig. 1. It is composed by a number of black or white little squares composing a code able to store a great number of information (7.089 characters).

QR-codes are very popular and well-known by a large amount of population, letting them be highly recognizable and tested from lots of people. They were born in 1994 for internal use of Toyota group; since 2000, they became more and more popular and are now applied in several fields.

The use of QR-codes for SMARTVINO project is recommended because of a lot of pros. First of all, QR-codes are very popular, thus the presence of one of them on the wine label



Fig. 1. Example of a QR-code.

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