

# ***The Arsenal of Venice and the Organisation of Domestic Hemp Growing in the Sixteenth and Seventeenth Centuries***

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*In the second half of the fifteenth century Venice introduced hemp growing in the countryside around Padua with the aim of substituting imported hemp – a raw material of strategic importance for the fleet – with domestic hemp. Venice thus freed itself from a dependence on other countries which was potentially dangerous, both politically and militarily. The project was without doubt one of the most important examples of agricultural policy in the Modern Age, both because of the means employed and the objectives pursued. From the beginning it was a joint venture between the public and private sector, giving rise to a “hybrid” organisation in which the State determined cultivation procedures, quantities and prices, thereby concentrating the power derived from both technical and economic policies and technical and economic control, whilst owners and tenants provided land and manpower. Owing to the widespread control exercised by the Venetian Republic and the very limited scope for decisions on the part of individuals, domestic hemp growing soon became an extension of the Arsenal’s organisational structure and the production of hemp became standard business for the public shipyard.*

## **1. Introduction**

During the last decades of the Middle Ages, the expansion of the Venetian fleet, the wars against the Ottoman Empire and the need to protect sea routes and coasts from raiders and pirates, led to a continuous growth of the Arsenal and, consequently, to the need for more abundant supplies of various raw materials and finished products. Such supply problems caused increases in the prices of many goods and even large dockyards with substantial financial resources, like the arsenal of Venice, found it difficult to be supplied according to their demands.

The evolution of the hemp market in the Venetian Republic from the fifteenth century is an illuminating example of the difficult relationship

between demand and supply. On the one hand, the total demand for hemp grew faster than its supply and, on the other hand, high-quality production became concentrated in Emilia and was controlled by a few large producers. The result was a situation of external dependence for a strategic good.

Hemp was, in fact, an indispensable raw material for the production of ropes and sails and the expenditure on hemp – mainly imported from abroad – was a major financial burden for the Republic. It is, therefore, not surprising that Venice itself decided to develop hemp plantation in its territories, in the attempt to satisfy at least part of the internal demand. The project involved enormous resources and was conceived on such a large scale that its outcome may be considered one of the major agricultural policies of early modern times. Its implementation was achieved through the use of public and private money that financed a business enterprise directly controlled by the State. The State was the main economic power determining the procedures and the means of cultivation, as well as quantities and prices. The landowners and farmers simply supplied land and labour.

The remaining part of this paper sets out to analyse the conditions, functioning and managerial tools of this very original and – to some extent – unique economic structure. The final part of the paper will assess the achievements, limits and the other possible ways in which the Venetian Republic could have improved hemp cultivation.

## **2. The origins of domestic hemp cultivation**

The domestic production of hemp was the outcome of three major events which – even if completely independent of each other – concurred to induce the Venetian government to develop a home-produced fibre<sup>1</sup>.

Firstly the Ottoman conquests in the East Mediterranean and the following conflicts between Turks and the Venetians led to an enlargement of the military fleet, the expansion of the production of the Arsenal and an increasing

<sup>1</sup> See F.C. LANE, 'The rope factory and the hemp trade of Venice in the fifteenth and sixteenth centuries', *Journal of Economic and Business History*, 4 (1932), p. 844 and ARCHIVIO DI STATO DI VENEZIA (from now on A.S.V.), "Patroni and Provveditori all'Arsenale", book (from now on b.), 537, 25 October 1455.

need for hemp<sup>2</sup>. The growing market concentration in the hands of a few big merchants in Emilia Romagna (due to the high quality and productivity of their plantations as well as to the blockade against importations from the Black Sea<sup>3</sup>), gave them the monopoly over the best fibres<sup>4</sup>. It also placed the *Serenissima* in a situation of external dependence for a strategic good<sup>5</sup>.

The Venetian conquest of the *terraferma* gave the Republic the opportunity to find a practical solution to such a problem through the creation of large hemp plantations in the newly acquired countryside<sup>6</sup>.

<sup>2</sup> On the advance of the Turks in the Mediterranean, see H. MAUS, W. ZU MONDFELD, *Alles Gold gehört Venedig. Die Weltmacht in der Lagune* (München 1978), pp. 260-261; P. ZANCARDI, 'La questione degli stretti turchi nella storia', *Rivista Marittima*, August-September 1981, p. 35 and M. TANGHERONI, *Commercio e navigazione nel medioevo* (Roma-Bari 1996), pp. 378-379. On the origins of Venetian presence in the Black Sea area, see M. MALOWIST, "Capitalismo commerciale and agricoltura", in R. ROMANO, C. VIVANTI (eds), *Storia d'Italia. Annali*. I (Torino 1985), pp. 460-461 and, on the development of the commercial routes between the Russian plains, from where the hemp was imported, and the Black Sea coasts, see A. BUGGE, 'Die nordeuropäischen Verkeerswege im frühen Mittelalter', *Vierteljahrsschrift für Sozial- und Wirtschaftsgeschichte*, 4 (1906), p. 245; J. KINKEL, 'Die altrussische Volkswirtschaft nach den ältesten literarischen und Rechtsquelle Altrusslands', *Vierteljahrsschrift für Sozial- und Wirtschaftsgeschichte*, 10 (1912), pp. 326-327 and E.C. SKRZINSKAJA, 'Storia della Tana', *Studi Veneziani*, 10 (1968), pp. 4-7. On the development of the port of Riga in modern times as a hemp market and as an alternative route for importation, see P. F. LÉVÊQUE, *Le chanvre. Culture, rouissage, broyage et teillage*, (Paris 1925), pp. 444; A. ATTMAN, 'The Russian market in world trade. 1500 - 1860', in *The Scandinavian Economic History Review*, 29 (1981) pp. 185-187 and 190-195 and E. HARDER-GERSDORFF, 'Riga im Rahmen der Handelsmetropolen und Zahlungsströme des Ost-Westverkehrs am Ende des XVIII Jahrhunderts', in *Zeitschrift für Ostmitteleuropäische Forschung*, 44 (1995), pp. 523-532.

<sup>3</sup> S. FAROQHI, *Geschichte des osmanischen Reiches*, (München 2000), pp. 33, 54 and 69.

<sup>4</sup> As a matter of fact hemp plantations could be found even in the Republic's territories. These plantations, nevertheless, were not able to produce fibres of the required quality and quantity. On the smaller hemp plantations, see. R. GRAND, R. DELATOCHE, *Storia agraria del medioevo*, (Milano 1968), pp. 336-337; D. PERCO, *Canapa e Lana*, (Feltre 1981), pp. 5-8 and 29 and I. PASTORI BASSETTO, 'La canapa nella Repubblica veneta', *Archivio Veneto*, 141 (1993), pp. 6 and 10.

<sup>5</sup> An effective enforcement of the blockade of hemp exports from the Emilian cities took place to some extent only during the conflict of the *interdetto* between Rome and Venice. See C. PONI, "Il prisma centese", in C. PONI, A. SAMARITANI (eds.), *Cento e la partecipazione agraria*, (Ferrara 1999), p. 365.

<sup>6</sup> On the Venetian conquest of the Po Valley, see L. VON RANKE, *Venezia nel '500*, (Leipzig 1878), pp. 80-83; E. MUSATTI, *Storia di Venezia*, I, (Milano 1936), pp. 292-300; H. MAUS, W. ZU MONDFELD, *Alles Gold gehört Venedig. op. cit.*, pp. 229-232; F.C. LANE, *Storia di Venezia*, (Torino 1991<sup>2</sup>), pp. 265-270; and on the effects of the conquest on the distribution of landed property, see W. F. VARANINI, "Proprietà fondiaria ed agricoltura", in A. TENENTI, U. TUCCI (eds.), *Storia di Venezia. Il Rinascimento: Società ed Economia*, V, pp. 807-813.

Such a decision followed political developments in Italy as well as in the Mediterranean area in the middle of the fourteenth century<sup>7</sup>.

Even if the importance of domestic hemp production was accepted by everyone, not everyone agreed about the best way of carrying it out. Some members of the government thought that the project could be developed only through private initiative. They were thus keen to support the efforts of landowners and peasants, encouraging their work and buying the fibres on the free market. Others claimed, however, that results could be achieved faster if government controls were enforced regarding the quantity and quality of hemp to be produced by plantations. This was argued in consideration of the arsenal's urgent needs and the uncertainty about private producers' effective investments.

### 3. Organisation and control of the hemp production

As the result of the decision to control hemp production through a state-led initiative based on law enforcement, it was established that landowners and peasants would be required to provide land and labour according to procedures established by the State. The Venetian administrators thus devised complex procedures and regulations regarding every aspect of hemp cultivation and production. These regulations aimed to achieve two different goals: a first set of directives was conceived to fix quantities and prices while a second set was established to achieve and maintain the highest possible quality of fibre.

The main problem concerning the first set of rules was to fix the number of fields considered necessary to achieve the desired amount of fibres and, at the same time, to share out production among the farmers<sup>8</sup>. The easiest

<sup>7</sup> On the importance of the project of domestic hemp cultivation, see A.S.V., *Patroni e Provveditori all'Arsenale*, b. 537, 12 October 1455 and A.S.V., *Patroni e Provveditori all'Arsenale*, b. 537, 25 October 1455.

<sup>8</sup> For hemp cultivation to be increased it was necessary to consider the normal tendency of farmers to grow cereals, the price of which was higher than the price paid by the government for hemp, especially in the late fifteenth and sixteenth century. This attitude, which had negative effects not only on the fibre but also on animal husbandry and on other crops, such as, for example, rice (see S. CIRIACONO, *Acque e agricoltura. Venezia l'Olanda e la bonifica europea in età moderna*, Milano 1994, p. 48), grew stronger in the late fifteenth century (see A.S.V., *Patroni e Provveditori all'Arsenale*, b. 538, 8 February 1586; *Id.*, 1 February 1594) and affected the European market. See W. ACHILLES,

solution was to force all the farmers in the district of Montagnana and Cologna Veneta to sow two fields of hemp for each couple of oxen they owned<sup>9</sup>: "...*item volemo ed ordenemo*"<sup>10</sup>, stipulated the law of 25 October 1455 that regulated these matters, "*per dare principio al seminare di detti canevi che i cittadini id Montagnana e suoi borgbi...per nostra decisione debbano seminare per cadaun paio di buoi campi doi di canapa...*"<sup>11</sup>. In this way the Venetian administration could rely on 440 fields. As a result of the increasing demand for raw material, in 1476, it was necessary to expand the land already under hemp growing (which amounted to 17,000 hectares) to include large areas of the district of Cologna Veneta and the adjoining farms, amounting to a total of 800 hemp fields "*a pena de lire 25 per cadaun campo che non avesse seminato ovvero fatto seminare da essere riscossa dal Podestà di Montagnana che se debba dividere non avendo accusator per metà al preditto Comun et metà al potestà di Montagnana et avendo accusador se debba dividere per un terzo*"<sup>12</sup>.

The extension of hemp cultivation was not the only problem. It was also necessary to provide production stability, in particular through constant investments and the application of correct managerial practices for infrastructures and animals. Consequently, each farm holding had to remain in the hands of the same family for quite a long time. In order to reach this goal, all short-term tenancies were ended and replaced by ten-year agreements<sup>13</sup>: "*Che reincantar si debba per anni diese a quelli che*

'Getreidepreis und Getreidehandelsbeziehungen europäischer Räume im 16. und 17. Jahrhundert', *Zeitschrift für Agrargeschichte und Agrarsoziologie*, 7 (1959), pp. 42-51 and MALOWIST, *Capitalismo*, *op. cit.*, pp. 500-501.

<sup>9</sup> Regarding ploughing technology, see A. DIECK, 'Terminologie der Pflugteile, älterer Pflugarten und des Pflüges. Ein Beitrag zur bäuerlichen Gegenstandskultur', in *Zeitschrift für Agrargeschichte und Agrarsoziologie*, pp. 160-161 and 166-169 and, about the origins of this instrument, see U. BERNER, 'Zur Typologie und Nomenklatur der Pflüge', in *Zeitschrift für Agrargeschichte und Agrarsoziologie*, 11 (1963), pp. 1-7.

<sup>10</sup> "In the same way it is our will and command".

<sup>11</sup> "In order to get underway the planting of hemp which the citizens of Montagnana" A.S.V., *Archivio proprio Contarini*, b. 26, 25 October 1455.

<sup>12</sup> "Under penalty of 25 lire for every field which they did not sow or had sown, to be collected by the Podestà of Montagnana and which will be shared if there is no informer half for the Comune and half for the Podestà, while should there be an informer, a third for each." PASTORI BASSETTO, "La canapa", *op. cit.*, p. 192.

<sup>13</sup> Cfr. A.S.V., *Patroni e Provveditori all'Arsenale*, b. 536, 13 September 1577 and PASTORI BASSETTO, "La canapa", *op. cit.*, pp. 11-12.

*più offrirà et questo a ciò che i conduttori dei detti territori per il più lungo tempo habbino maggiore habilità a far di canevi...non potendo i conduttori di detto paludo seminare o fare seminare altro che canevo*<sup>14</sup>.

Once the quantity and constancy of production were achieved, the Senate set the price to be paid by the State for the hemp harvested in Venetian territories. The price was set on the basis of the expected costs of production. This aimed to provide farmers with a sufficient revenue to cover the expenses for seeds, manure and labour and also to foster better work practices and productivity. Prices were also set in such a way as to supply the Arsenal with high quality raw materials at reasonable levels. Moreover low internal prices were regarded as the only solution to limit the influence of the Bologna merchants in the market.

All these aims were correct but they were in conflict with one another<sup>15</sup>. The Venetian government generally gave priority to cost-saving decisions, thus keeping hemp prices at the lowest possible level. However, the results of such a strategy were disappointing in the long term and the poor returns of hemp cultivation were certainly one of the most important causes of the major crises affecting Venetian production in the late sixteenth and in seventeenth centuries<sup>16</sup>.

The price of hemp was an important issue not only for the State but also for producers. They had no other complementary earnings from selling their produce on the free market, as the administration of the *Serenissima* pre-

<sup>14</sup> "Which has to be rented out again for ten years to those who offer the highest price so that the farmers of those lands given the longer lease have greater opportunity to grow hemp...since the farmers of the Montagnana marshland are unable to sow or to have sown anything other than hemp." A.S.V., *Patroni e Provveditori all'Arsenale*, b. 537, 25 October 1455.

<sup>15</sup> A.S.V., *Archivio Proprio Contarini*, b. 26, 10 September 1594 and 24 March 1594.

<sup>16</sup> A.S.V., *Patroni e Provveditori all'Arsenale*, b. 538, 19 January 1502 and A.S.V., *Archivio proprio Contarini*, b. 26, 26 March 1594. The growing difference between the price set by the State, the value of the crops and that of the hemp on the free market, drove the producers of Montagnana to present a petition to the Senate, explaining the difficulties in producing in such conditions and point out that if higher prices could not be allowed, harvests would fall to very low levels. The Senate understood the situation very well and, in 40 years, increased the price from 18 to 32 lire for 100 pounds. On this problem, see A.S.V., *Patroni e Provveditori all'Arsenale*, b. 536, 4 June 1594; A.S.V., *Compilazione leggi*, b. 107, 4 June 1632 and A.S.V., *Archivio proprio Contarini*, b. 26, 1 February 1592; *Id.*, 26 March 1594 and PASTORI BASSETTO, "La canapa", *op.cit.*, p. 33 and 38-39.

empted the whole harvest for the Arsenal and ordered that all the fibres should be placed in state-run warehouses and sold to the government dockyards of Castello.

These measures aimed at obtaining the necessary amount of raw material at the lowest possible price. Other measures, however, were needed to obtain the desired quality. A second set of regulations was introduced to make farmers work according to the best practices and with the most suitable instruments and means. The local farmers and Venetian administrators had no practical experience in this field. All procedures were drawn up and put into practice with the aid of Michele da Budrio, an expert from Budrio<sup>17</sup>, a town in Emilia Romagna famous for its hemp plantations. Michele da Budrio not only produced a detailed handbook of every aspect of hemp production but he also planned and oversaw the construction of the necessary infrastructures, such as canals, pipelines and ponds for soaking the hemp<sup>18</sup>.

<sup>17</sup> On the origins and role of Michele da Budrio, the so-called *sopraistante*, see LOMBARDO, "Il problema", *op.cit.*, pp. 192-193; PASTORI BASSETTO, "La canapa", *op.cit.*, p. 10 and A.S.V., *Archivio proprio Contarini*, b. 26, 25 October 1455; *Id.*, 19 January 1502; A.S.V., *Patroni e Provveditori all'Arsenale*, b. 538, 25 November 1562 and *Id.*, 18 January 1564. We stress that the chief expert on domestic hemp growing came from Budrio, home of the best fibre cultivations in Italy. On this subject, see A. BIGNARDI, *Le campagne emiliane nel Rinascimento e nell'età barocca*, (Sala Bolognese 1978), pp. 20-24; C. VILLARI, "Cento ed il centese nel basso medioevo", in ISTITUTO STUDI GIROLAMO BARUFFALDI (ed.), *Storia di Cento. Dalle origini alla fine del XVI secolo*, (Cento 1987), pp. 317-320; B. ANDREOLLI, *Le regole della Partecipanza tra conservazione e innovazione*, in C. PONI, A. SAMARITANI (eds.), *Cento e la Partecipanza agraria*, (Ferrara 1999), pp. 47 and 50-55 and M.G. MUZZARELLI, *Vita e società centese fra XV e XVI secolo*, in C. PONI, A. SAMARITANI (eds.), *Cento e la Partecipanza agraria*, (Ferrara 1999), pp. 104-107 and 114-115. Lastly we notice that if the year 1455 marked the beginning of domestic hemp cultivation", in the year 1456, with the recruitment of Michele da Budrio, the way was paved for obtaining the same level of hemp production as Bologna, a target which were almost reached in the year 1502. On this growth, see *Archivio proprio Contarini*, b. 26, 19 January 1502; LANE, "The rope", *op.cit.*, pp. 835 and 844 and PASTORI BASSETTO, "La canapa", *op.cit.*, p. 10.

<sup>18</sup> On the rules for soaking hemp in order to separate the fibres, see A.S.V., *Patroni e Provveditori all'Arsenale*, b. 537, 25 October 1455; A.S.V., *Archivio proprio Contarini*, b. 26, 25 January 1456; *idem.*, 25 October 1460; *idem.*, 19 February 1592; *idem.*, 18 June 1588; *idem.*, 18 October 1594; A.S.V., *Patroni e Provveditori all'Arsenale*, b. 537, 13 November 1588 and *idem.*, 31 January 1591. On the ponds for soaking hemp following the Bologna method, see C. POLLINI, *Catechismo agrario*, (Verona 1821), p. 189; A. DONÀ DALLE ROSE, *La canapa*, (Roma 1938), pp. 59, 61 and G. GAMBERINI, *L'economia centese e la sua componente ebraica*, in C. PONI, A. SAMARITANI (eds.), *Cento e la Partecipanza agraria*, (Cento 1999), pp. 390-393.

The resulting system was very advanced and comprehensive but it was perceived that it could only function if the farmers strictly followed all the instructions and did not make any attempt to turn the rules to their own advantage or to lessen the difficulties of work. In order to control the workers and to ensure that peasants and landowners would observe the law, the Republic appointed new functionaries, whose goal was to supervise the correct application of work procedures and to ensure that rules were enforced, with the duty to punish those who failed to comply with these instructions. A highly complex organisation for management, control and repression was set up. The directors of the Arsenal were at the head of this system and several operational divisions checked every aspect of the process in all the hemp fields lying between Este and Cologna Veneta.

#### **4. The management and control of domestic hemp production**

The organisation of domestic hemp cultivation was a very vertical one. At the top were the leading directors of the Arsenal and at the bottom technicians, controllers and assistants who did the field work. In order to gain a better understanding of such a structure, we need to describe its major functions, their relationship and tasks (see also *Figure 1* and *Table 1*).

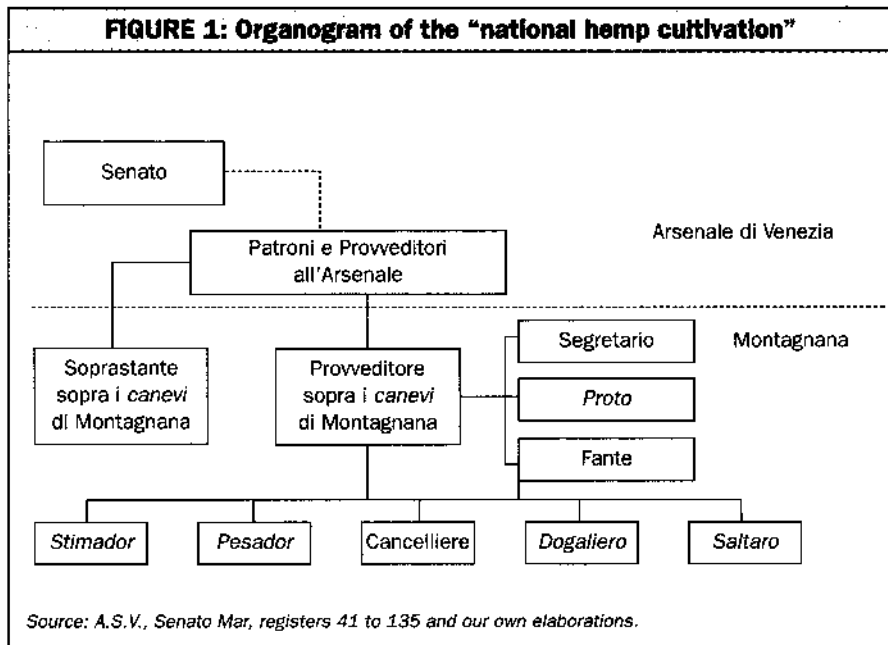
The Arsenal's chiefs and superintendents, the so-called *Patroni e provveditori all'Arsenale* and the Castello's dockyards highest authority, overviewed the general business of the hemp plantations, set prices, managed the personnel, analysed yields and decided on actions to solve problems and to improve the quality and quantity of harvests.

The Senate gave this responsibility to the Arsenal's chiefs because it believed that control over the production process had to be in the users' hands, as the latter understood better than anyone else the characteristics of good hemp and the amount of fibres needed. This was a rational policy but it led to a complete subordination of plantation management to the needs, aims and policies of the Arsenal. It also led to the loss of any possible autonomy on the part of farmers.

The Arsenal chiefs exercised their control through an inspector for

hemp called the *provveditore ai canevi*, who was chosen among the chiefs themselves and acted as a link between the capital and its territories<sup>19</sup>. This is why he was sent every year to Montagnana, where he represented the Arsenal's interests and effectively managed the hemp cultivations. He lived, at least for a part of the year, in Montagnana, where he had the opportunity to be in close contact with tenant farmers and owners. He was, therefore, in the best position to implement instructions, to report on results and on difficulties, to understand the producer's grievances, to control law enforcement, to overview the general functioning of the organisation, to identify any infringement of the rules, to impose penalties and, after the harvest, to select and purchase the best fibres<sup>20</sup>.

The hemp inspector could rely upon the services of two technical experts and of many other public servants appointed by the management



<sup>19</sup> The presence of the hemp inspector in Montagnana was reduced, in the third decade of the seventeenth century, to only four months a year for cost-reduction reasons. This decision led to very negative consequences, then it gave the impression that the State was no more so interested in the hemp production and contributed in this way to an increase in fraud and smuggling. About this problem, see LOMBARDO, "Il problema", *op.cit.*, p. 190.

<sup>20</sup> A.S.V., *Archivio proprio Contarini*, b. 26, 25 January 1456.

of the Arsenal. The two experts – the *pesador* and the *stimador* – had a very important role in cooperating with the *provveditore* to select and buy the best fibres<sup>21</sup>. The *pesador* was specialised in weighing the hemp. This was a very delicate activity, as the sellers' earnings depended on its results. The *stimador* recorded the amounts, values and owners of the purchased fibres in a register that was sent to the Arsenal's chiefs for control and approval and on a label attached to each bundle of hemp. The work of these experts was controlled by a *stimador* and a *pesador* appointed by the community of Montagnana, who represented the interests of the farmers and were supposed to detect improper practices and favouritism<sup>22</sup>.

**TABLE 1. Management and control structure of domestic hemp cultivation**

Function	Tasks
Patroni e Provveditori all'Arsenale	Senior management and control of production and personnel. Global strategy planning. Price setting.
Provveditore ai canevi	Quality, quantity and personnel management. Link between the Arsenal and the fields. Control over correct application of cultivation procedures and laws. Management of infrastructures. Setting the penalties. Choosing and purchasing hemp.
Soprapstante	Technical management. Drawing up and implementation of best practices and cultivation methods. Farmers' training. Substituting the soprapstante when absent.
Pesador	Weighing the hemp during purchase. Controlling the amount of the hemp produced. Quantity controls.
Stimador	Book-keeping concerning hemp production and sending the registrations to the patroni e provveditori for auditing and approval.
Proto della tana	Overviewing general functioning of hemp production.
Fante della tana	Any operative task.
Cancelliere personale	All book-keeping concerning the costs and the activities of the provveditore.
Dogallero	Managing the water supply and the functioning of canals.
Saltaro	Controlling sowing and soaking ponds. Overviewing quality of seeds, methods for sowing, ploughing, cleaning and preparing the fields. Estimating yields for following harvest.

Source: A.S.V., Senato Mar, Registers from 41 to 135 .

<sup>21</sup> A.S.V., *Patroni e Provveditori all'Arsenale*, b. 539, 11 September 1598.

<sup>22</sup> A.S.V., *Patroni e Provveditori all'Arsenale*, b. 537, 9 August 1531; A.S.V., *Archivio proprio Contarini*, b. 26, 11 August 1533 and A.S.V., *Patroni e Provveditori all'Arsenale*, b. 537, 13 September 1550.

If any such cases occurred, the matter was submitted to the hemp inspector, who investigated and decided on what action to take at his discretion<sup>23</sup>.

The hemp inspector was helped in his daily tasks by a personal secretary – the so called *cancelliere personale* – who produced all the official documents, kept the books and checked the costs. Further help was provided by a *proto della tana* (an experienced and specialised worker in rope manufacture, who participated in the overview of hemp cultivation), a *fante della tana* (a worker of the “tana” who could be used for any kind of task)<sup>24</sup>, a *dogaliero* and a *saltaro*.

The *dogaliero* was appointed by the Arsenal’s chiefs and, with the aid of a secretary, he controlled all matters concerning the water supply, its canalisation and use in the ponds for soaking the hemp<sup>25</sup>. If he detected any irregularities, he had the power to impose penalties and fines<sup>26</sup>.

The main duty of the *saltaro*<sup>27</sup> was to control the ponds for soaking hemp in order to prevent any person from damaging hemp production, either acting for his own benefit or simply to avoid sowing hemp, which became likely when the prices of the national hemp fell far below those of other crops. Secondly he overviewed the quality of seeds, the sowing, the ploughings, the cleaning and preparation of the fields. Finally in August he accompanied the *pesador* and the *stimador* when they inspected the fields and he estimated yields for the following harvest<sup>28</sup>.

The last and, to some extent, most important public servant of domestic hemp cultivation was the hemp supervisor, the so-called

<sup>23</sup> A.S.V., *Patroni e Provveditori all’Arsenale*, b. 537, 9 August 1531.

<sup>24</sup> A.S.V., *Patroni e Provveditori all’Arsenale*, b. 540, 10 October 1620.

<sup>25</sup> We should point out that the quality of the fibres from the Emilia was due to the better control and use of the water. On this question, see C. PONI, *Fossi e cavedagne benedicono le campagne*, (Bologna 1982), pp. 18, 100-107, 113 and 118 and CRIACONO, *Acque, op.cit.*, pp. 46, 49-50. Interesting information on the management of the water supplies in the Emilia plain are to be found in W. ANGELINI, *Richiami bibliografici intorno all’annosa polemica sulle acque padane a meridione di Ferrara (Cinquecento-tardo Settecento)*, in CENTRO STUDI GIROLAMO BARUFFALDI (ed), *La pianura e le acque tra Bologna e Ferrara*, Atti dal convegno di studio, Cento 18-20 March 1983, (Cento 1993), pp. 19-29.

<sup>26</sup> A.S.V., *Archivio proprio Contarini*, b. 26, 25 October 1460 and A.S.V., *Patroni e Provveditori all’Arsenale*, b. 537, 25 October 1455.

<sup>27</sup> The word comes from the late Latin *saltarius*, which comes from the classical Latin *saltus*, forest. DE MAURO T., MANCINI M. (eds.) *Dizionario etimologico*, (Milano 2000), p. 1835.

<sup>28</sup> A.S.V., *Patroni e Provveditori all’Arsenale*, b. 538, 1 February 1592.

*soprastante ai canevi*. He was an expert in agrarian matters and was responsible for training farmers, for devising work procedures and drawing up guidelines for their implementation. He also substituted for the inspector when he was not present or in the years when, for budget reasons, he had not been appointed.

The origins of this function are related to the innovative nature of hemp cultivation in the territories of the Republic during the fifteenth century and to the ignorance of farmers and landowners in such matters<sup>29</sup>. The supervisor had the task of identifying, recording and teaching the best practices to cultivate hemp. When all these matters had been settled and the skills required for producing hemp had been acquired by farmers, he filled the role of chief technician, aid and counsellor of the inspector and of the Arsenal's chiefs<sup>30</sup>. The first supervisor, Michele da Budrio, had been appointed by the Senate. As a reward for his excellent work, the Senate made his position hereditary and granted him a life revenue of 3 ducates per month. However, at the end of the sixteenth century, when domestic hemp cultivation was in decline and the Senate blamed the diminishing returns on poor technical competence, this tradition was changed with the annual appointment of a supervisor by the Arsenal's chiefs.

*Figure 1* shows that the Arsenal's chiefs controlled all the major factors and variables of the management of domestic hemp cultivation. The Arsenal chiefs established not only the price, but, through the hemp inspector and the supervisor, they also managed all the technical aspects of hemp growing, the creation, development and management of infrastructures, the devising and implementation of all the procedures and laws concerning hemp production and the selection and purchase of the fibres for the Arsenal. This system was conceived in such a way that the important decisions were taken by the Arsenal's management. The tenants and landowners were left with the task of finding the best

<sup>29</sup> A.S.V., *Patroni e Provveditori all'Arsenale*, b. 538, 23 March 1594.

<sup>30</sup> On the hemp supervisor, see PASTORI BASSETTO, "La canapa", *op.cit.*, p. 10. On Budrio see ANDREOLLI, "Le regole", *op.cit.*, pp. 47 and 50-55; VILLARI, "Cento ed il centese", *op.cit.*, pp. 317-320. On the Republic's decision to grant him a life revenue and to make his position hereditary see LOMBARDO, "Il problema", *op.cit.*, pp. 190, 192 and A.S.V., *Archivio proprio Contarini*, b. 26, 19 January 1502.

possible solutions within a framework whose main features had been already defined. It is, therefore, reasonable to say that the hemp plantations, even if formally independent, were, in actual fact, fully part of the Arsenal's organisation.

## **5. Domestic hemp production as a case of vertical integration**

The integration of Montagnana's hemp cultivation into the main organisation of the Arsenal was the inevitable consequence of the control exercised by the management of the government dockyard over every aspect of fibre production. The Arsenal and the fibre plantations were formally independent, but in practice they were part of a single organisation with a single managerial structure and a common policy.

To describe this arrangement in modern terms and to understand more clearly the real situation at the time, we could assume that the dockyards of Castello, a state-owned factory producing principally galleys, ships, ropes, sails and any other material necessary for shipping, but also weapons and gunpowder, extended, at a certain moment in its history, its management and control over the suppliers of an essential raw material, enlarging its organisational sphere and adopting, thereby, a strategy of vertical integration<sup>31</sup>.

The distinctive feature of this process was that the Castello dockyards did not buy any land, farms or even instruments for hemp cultivation. The Arsenal obtained this result simply through administrative procedures. It was not ownership of the means of production, but the law which gave the Arsenal control over the fibres cultivated in Montagnana. The tenants and the landowners were forced – without theoretically losing any rights – to act according to the needs of the government dockyard. They had to adopt prescribed methods and work procedures and, last but not least, to deliver the entire harvest to the Arsenal at a fixed price which only the Arsenal's chiefs and the Senate could fix and change. The producers were not entitled

<sup>31</sup> On vertical and horizontal integration, see A. JACQUEMIN, *La nuova economia industriale. Meccanismi di mercato e comportamenti strategici*, (Bologna 1989), pp. 164-174 and 206-216 and G. VOLPATO, *L'analisi di settore: aspetti strutturali e dinamici*, in *L'impresa industriale*, a cura di M. RISPOLI, (Bologna 1989), pp. 154-161 S

to any ownership rights and were not free to dispose of land, while the Arsenal's chiefs acted as the real managers of a state-owned farm<sup>32</sup>.

## 6. Conclusions

In order to secure a continuous supply of hemp at the lowest possible price, the Republic of Venice organised a unique system of production, based on the management and control by the State of private property and labour. It thus achieved an effective integration of hemp plantations within the organisation of the Castello Arsenal.

On the one hand, this solution allowed the Republic to gain pseudo-property rights without incurring any purchase costs. On the other hand it produced many negative effects. The land-owners and, above all, the tenant farmers saw hemp growing as an obligation involving labour costs. When the prices of other crops grew higher than those of the fibre, it also became a burdensome restriction of income. Hemp cultivation could therefore only survive through continuous controls and heavy penalties. It was also dependent on the efficient functioning of the Venetian administration in Montagnana and, at the same time, it was undermined by the opposition from the local population.

These contradictions in the system became so marked that they were one of the major factors explaining the production crisis in the late sixteenth and the seventeenth century. It was at this time that the harvests reached very low levels and the Republic was forced to purchase large quantities of hemp from Bologna. The rationality and efficiency of the entire system was thus questioned. But we also doubt whether Venice had any other choice or means of securing the hemp it needed.

The *Serenissima* could have supported the spontaneous, private-led development of fibre production. The size of the market and expected

<sup>32</sup> On the concept of organisational control, see V. CODA, *L'orientamento strategico dell'impresa*, (Torino 1988), pp. 13-18; J.B. QUINN, H. MINZBERG, R.M. JAMES, *The strategy process. Concepts, contexts, and cases*, (London 1988), pp. 276-280, 279-311 and 325-330; R.W. SCHMENNEN, *Produzione. Scelte strategiche e gestione operativa*, (Milano 1987), pp. 415-425 and F. ISOTTA, *Le forme organizzative*, in M. RISPOLI (ed.), *L'impresa industriale*, (Bologna 1984), pp. 685-700.

returns would have surely provided an incentive. Bologna was a good example to emulate and achieved very high productivity levels. At the same time, however, the market position of the Emilian producers made this experiment very difficult and uncertain in its results. How long would it have taken for local farmers to achieve the quality of their direct competitors in an enterprise that was new and complicated? The Venetian authorities were aware that the project would have probably been unsuccessful.

Another way to obtain hemp supplies was through international trade and finding new markets and supplies as an alternative to Bologna. In retrospect, however, if it had been adopted, this solution would have probably been very disappointing. There were no other suppliers of high quality hemp and the existing producers, located principally in Russia, were very difficult to reach. In the South, the Ottoman Empire blocked the way to the Black Sea; in the North, routes to the Baltic ports were extremely long and, in most cases, controlled by Holland and England, who did not allow any competition in such an important market.

The Republic had only one other possibility. Venice could enforce rules and hemp growing procedures on its own land and not on privately owned farms, using wage-labourers. In the fifteenth century the Republic owned large areas that could have been employed for hemp production. It could count upon very good management skills and – through the employment of Michele da Budrio – technical knowledge. The State also possessed the capital to prepare fields for cultivation and build infrastructures. The *Serenissima* could have employed enough agricultural workers to grow hemp under strict regulations, thus avoiding all the mistakes and problems with prices, laws, controls and the hostility of tenant farmers and landowners<sup>53</sup>. Montagnana would have been managed as an integral part of the Arsenal, where hemp, rather than ships, oars and sails, would have been produced. Hemp production could have been organised as a large State farm using the methods and means already applied in the dockyard without the negative consequences and contradictions we have already analysed. Moreover the State could have

<sup>53</sup> A.S.V., *Patroni and Provveditori all'Arsenale*, b. 538, 12 October 1592.

created the type of agricultural enterprise suited to hemp production: extensive farming, professionally managed and employing wage labour.

In this way the *Serenissima* would have adopted the methods and managerial practices used by agricultural enterprises in the eighteenth century which obtained excellent results in hemp production. But it is unlikely that even the Republic could have been two centuries ahead of its time. We must therefore assume that at that time the system adopted by the Republic was – even with all its disadvantages – the best available system for achieving the given goals.

#### REFERENCES

- ACHILLES W., 'Getreidepreis und Getreidehandelsbeziehungen europäischer Räume im 16. und 17. Jahrhundert', *Zeitschrift für Agrargeschichte und Agrarsoziologie*, 7 (1959).
- ANDREOLLI B., "Le regole della Partecipanza tra conservazione e innovazione", in C. Poni, A. Samaritani (ed.), *Cento e la Partecipanza agraria*, (Ferrara 1999).
- ANGELINI W., "Richiami bibliografici intorno all'annosa polemica sulle acque padane a meridione di Ferrara (Cinquecento-tardo Settecento)", in Centro Studi Girolamo Baruffaldi (ed.), *La pianura e le acque tra Bologna e Ferrara*, Atti dal convegno di studio, Cento 18-20 March 1983, (Cento 1993).
- ATTMAN A., 'The Russian Market in World Trade. 1500 – 1860', in *The Scandinavian Economic History Review*, 29 (1981).
- BIGNARDI A., *Le campagne emiliane nel Rinascimento e nell'età barocca*, Sala Bolognese 1978.
- BUGGE A., "Die nordeuropäischen Verkehrswege im frühen Mittelalter", *Vierteljahrschrift für Sozial - und Wirtschaftsgeschichte*, 4 (1906).
- CIRIACONO S., *Acque e agricoltura. Venezia l'Olanda e la bonifica europea in età moderna*, (Milano 1994).
- CODA V., *L'orientamento strategico dell'impresa*, (Torino 1988).
- DE MAURO T., MANCINI M. (ed.), *Dizionario etimologico*, (Milano 2000).
- DIECK A., "Terminologie der Pflugteile, älterer Pflugarten und des Pfluges. Ein Beitrag zur bäuerlichen Gegenstandskultur", in *Zeitschrift für Agrargeschichte und Agrarsoziologie*.

- DONÀ DALLE ROSE A., *La canapa*, (Roma 1938).
- FAROQHI S., *Geschichte des osmanischen Reiches* (München 2000).
- GAMBERINI G., "L'economia centese e la sua componente ebraica", in C. Poni, A. Samaritani (ed.), *Cento e la Partecipanza agraria*, (Cento 1999).
- GRAND R., DELATOUCHE R., *Storia agraria del medioevo* (Milano 1968).
- HARDER-GERSDORFF E., 'Riga im Rahmen der Handelsmetropolen und Zahlungsströme des Ost-Westverkehrs am Ende des XVIII Jahrhunderts', in *Zeitschrift für Ostmitteleuropäische Forschung*, 44 (1995).
- ISOTTA F., "Le forme organizzative", in M. Rispoli (ed.), *L'impresa industriale*, (Bologna 1984).
- JACQUEMIN A., "La nuova economia industriale. Meccanismi di mercato e comportamenti strategici", in Rispoli M. (ed.), *L'impresa industriale*, (Bologna 1989), pp. 164-174.
- KINKEL J., 'Die altrussische Volkswirtschaft nach den ältesten literarischen und Rechtsquelle Altrusslands', *Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte*, 10 (1912).
- LANE F.C., 'The rope factory and the hemp trade of Venice in the fifteenth and sixteenth centuries', *Journal of economic and business history*, 4 (1932).
- LANE F.C., *Storia di Venezia*, 2nd edn. (Torino 1991).
- LEVEQUE P. F., *Le chanvre. Culture, rouissage, broyage et teillage* (Paris 1925).
- MALOWIST M., "Capitalismo commerciale and agricoltura", in Romano R., Vivanti C. (eds.), *Storia d'Italia. Annali. I* (Torino 1985).
- MAUS H., ZU MONDFELD W., *Alles Gold gehört Venedig. Die Weltmacht in der Lagune* (München 1978).
- MUSATTI E., *Storia di Venezia*, I (Milano 1936).
- MUZZARELLI M.G., "Vita e società centese fra XV e XVI secolo", in C. Poni, A. Samaritani (ed.), *Cento e la Partecipanza agraria*, (Ferrara 1999).
- PASTORI BASSETTO I., 'La canapa nella Repubblica veneta', *Archivio Veneto*, 141 (1993).
- PERCO D., *Canapa e Lana* (Feltre 1981).
- POLLINI C., *Catechismo agrario*, (Verona 1821).
- PONI C., "Il prisma centese", in C. Poni, A. Samaritani (eds.), *Cento e la partecipanza agraria*, (Ferrara 1999).
- PONI C., *Fossi e cavedagne benedicono le campagne*, (Bologna 1982).
- QUINN J.B., MINZBERG H., JAMS R.M., *The strategy process. Concepts, contexts, and cases*, (London 1988).

- SCHMENNER R.W., *Produzione. Scelte strategiche e gestione operativa*, (Milano 1987).
- SKRZINSKAJA E.C., "Storia della Tana", *Studi Veneziani*, 10 (1968).
- TANGHERONI M., *Commercio e navigazione nel medioevo* (Roma-Bari 1996).
- VARANINI W. F., "Proprietà fondiaria ed agricoltura", in Tenenti A., Tucci U. (eds.), *Storia di Venezia. Il Rinascimento: Società ed Economia*, V.
- VILLARI C., "Cento ed il centese nel basso medioevo", in Istituto Studi Girolamo Baruffaldi (ed.), *Storia di Cento. Dalle origini alla fine del XVI secolo*, (Cento 1987).
- G. VOLPATO, "L'analisi di settore: aspetti strutturali e dinamici", in Rispoli M. (ed.), *L'impresa industriale* (Bologna 1989), p. 206-216.
- VON RANDKE L., *Venezia nel '500* (Leipzig 1878).
- ZANCARDI P., 'La questione degli stretti turchi nella storia', *Rivista Marittima*, August-September 1981,

